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ABSTRACT

At a conference in 1988 the Maricopa Community Colleges (Arizona) began the process that resulted in development of the Ocotillo Action/Research Groups to study the development of educational technologies in the community college setting. This year-end report presents the following reports of the various working groups, which summarize activities since the last report: (1) "Administrative Computer Conferencing" (K. C. Hundere and Bill Snyder); (2) "Discipline Dialogues" (John Mildrew and Jon Travis); (3) "Electronic Forms and Approvals" (Ken Roberts and Nonie Bernard); (4) "Instructional Computer Conferencing" (Karen Schwalm and Shirley Lowman); (5) "Library Users Group" (Toni Rodriguez and Laurita Moore de Diaz); (6) "Non-Traditional Instructional Issues" (Mary Alcon and Mike Rooney); (7) "Support for Technologies" (Barbara Kilpatrick, Jamie Cavalier, and Debbie Krumtinger); and (8) "Standards" (Manny Griego and Don Shehi). (SLD)

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

During the Fall 1987 semester, when I made my usual visits to our colleges/centers, I asked to meet with groups of faculty members to discuss the **instructional agenda** for technology in the Maricopa County Community College District.

I asked such questions as:

1. What has happened as a result of all the money invested in computers/telecommunications technology? What are the instructional and organizational benefits?

2. Are we in control of the teaching/learning process or are we driven/limited by what technology we have or is available?

I raised a larger number of questions, but the basic questions I raised were:

Who is in charge of the instructional agenda?
Who should be?

The faculty response is manifested in the creation of **Ocotillo**, which clearly indicates to me that our faculty not only took charge of the agenda; but, as one who knows MCCCD faculty would know and expect, have moved our discussions and dialogue to the brink of technology and its best use in the teaching/learning processes.

Through the "bubbly" of **Ocotillo**, our faculty have developed new paradigms, have introduced new metaphors for describing the world we and our students live in, and have placed us in a strategic position to manage our future.

A very large number of faculty and staff have worked very hard in the **Ocotillo** process, and we thank them all for their effort, their enthusiasm, and their vision.

Muchas gracias.

Alfredo G. de los Santos Jr.
Vice Chancellor, Educational Development

I have a spelling checker,
It came with my PC;
It plainly marks four my revue
Mistakes I cannot sea.

I've run this poem threw it,
I'm sure your pleased too no,
It's letter perfect in it's weigh,
My checker told me so.

Source: Unknown

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PREFACE

Infusing an innovation, a concept, or a vision as a mind set can be temporal, dynamic, and ephemeral such that people, even those who are active participants, are not fully aware of its impact or evolution. Ironically, Ocotillo, as a major technological agenda has been more of a spirited movement than a formal infusion of technologies into the Maricopa culture. The MCCCD organization, its people and institution, has embraced Ocotillo as the abstract "cause celebre" to promote and to focus on technology and the teaching/learning processes.

People still ask, "What is Ocotillo?" But no one can give **"the"** single answer. Yet, like most positive Maricopa movements, change has occurred. Ocotillo has been hesitant to claim credit for accomplishments. Rather, the Ocotillo process draws people in to share their visions and to work together to accomplish their goals. As this process unfolds, people gather together bringing with them their own ideas and the experience they have gained at their respective colleges. The interaction then, provides the impetus for people to promote change. In this spirit, the following highlights have occured because of the collaborative efforts of many people and the support of the Ocotillo process.

*Discipline Dialogues

This concept was adapted by the Teaching and Learning group. This was modeled after a national model to form academic alliances for and by faculty to promote professional growth and collegiality.

*District Grants Office

The Alternate Funding group recommended that this office be formed so that Maricopa could look to alternative sources of funding to support teaching and learning.

*Designing Libraries for the Future Now

When the Library of the Future group brought in persons involved in USC's "Library of Tomorrow" project, there was a mutual attraction between the USC representatives and MCCD personnel. This relationship has benefited the district in several ways (i.e., planning, etc.).

*EMCC and MCC Planning

Philip Thompkins, who was introduced to Maricopa through Ocotillo, joined our district, first as a consultant from USC, and later as a member of the MCCD family. EMCC, MCC, and the rest of the district have benefited by the experiences that he brings in promoting technological solutions to enhance teaching and learning.

*Project Jefferson

This year, five (5) colleges have been working together to develop instructional materials using the Jefferson Notebook authoring tool. Although this is not an Ocotillo project, it has occurred because of Ocotillo and its contact and close relationship with USC.

*Internet/BITNET Training

A few Maricopa students and employees have been using Internet and BITNET services for some time now. As a result of the Ocotillo Library Group, many more were introduced to the world of electronic information available to any networked computer terminal in the district and throughout the world.

*Online and CD-ROM Database

The Library group has gathered information and compiled this catalog of resources available in the district.

*Library Automation System Used for Software Information

Several colleges have begun to use the Library Automation System to catalog and track software. This recommendation came out of Ocotillo two years ago.

*Automated Posting Request System

Ocotillo has pushed forward the notion that paper and form-driven systems, even those requiring multiple authorizations, can be done electronically. Ocotillo intends this system to be a model for replacing other paper systems.

*Recommended Changes to Accommodate OE/OE Needs

The Non-Traditional Instructional Issues group has recommended the following: 1) adoption of a definition of open-entry/open-exit courses; 2) implementation of an in-progress grade (IP); 3) include end contract dates on final grade rosters; 4) continue development and use of INFORM for OE/OE record keeping; and 5) that the Residential Faculty Policy Manual reflect the unique instructional roles of faculty involved in OE/OE instruction.

*District-wide Use of Electronic Forum

Ocotillo has recognized the need for computer conferencing. Karen Schwalm, GCC faculty was able to promote and orient others from all colleges to begin using the Electronic Forum. This allowed students and faculty to interact and discuss ideas electronically.

*Computer Conference for HyperCard Developers

The Electronic Forum was used this year to allow faculty and staff who share a common interest to help each other as they developed or used HyperCard stacks.

*Comprehensive Technical Standards Document

Last year the Standards group wrote a document containing the technical standards and guidelines for the district. This year, expanded and updated document has become invaluable for planning and implementing technologies as colleges renovate and build facilities.

*District Office/College Cooperative Training Efforts

This year, a collaborative training effort was piloted at several colleges where college trainers work closely with Training Services. This effort marks a step forward in collaborative efforts between the district office and the colleges to address the many training needs that exist.

*Guidelines for Shared Classes

Through Ocotillo, guidelines have been proposed for shared interactive video classes--those taught at one college and transmitted by microwave to another college.

The 1990-91 movement that Ocotillo has fostered is captured as a snapshot in this report. The subcommittees have documented their work as a collection of photographs, some crisply focused as a final product or process and others are blurred images still needing more discussion and definition.

Read the report. Chew on it. Discuss points and counterpoints with your colleagues, the group chairs, administrators, staff or anyone you can find. Be challenged and spit out more seeds for thought, possibly for the **next** Ocotillo agenda.

We would like to thank the group leaders for their support and leadership in directing the discussions and in formulating this document. Sincere thanks go to the many committee members who have flowed in and out of the Ocotillo process to share their ideas and energy to improve teaching and learning through technology. It is this cooperative spirit and creative genius that make Maricopa great and continue to be leaders in innovation and change.

Ocotillo Co-managers

Jim Walters
Phoenix Community College

Naomi Story
Maricopa Center for
Learning and Instruction

This report has been compiled and produced by Karla Hagel assisted by Donna Kardell, Anastasia Amabisca and Sandra Rankin for the Maricopa Center for Learning and Instruction.

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ADMINISTRATIVE COMPUTER CONFERENCING

BY: KC Hundere, GCC
Bill Snyder, DIST

CHARGE:

Develop a plan for implementing a computer conference system to serve the non-instructional needs of MCCCD.

Background

As this committee was given the charge to plan the implementation of computer conferencing across the District, it was decided that the committee met via the technology, and avoid face-to-face meetings when possible. The committee affirmed the decision of the previous committee that VAXNotes was the proper choice for administrative use. It allows a conference to span all Maricopa nodes and organizes discussions within each conference.

Year In Review

The committee worked on several agendas. First, we helped each other become familiar with the program. We decided we would attempt to write user documentation. After some discussion, it was decided that the documentation would take two (2) forms--a written user guide and an on-line tutorial file. The written documentation would include a "quick start" instruction guide, as well as keypad and command references. The on-line tutorial would be an actual conference. For every new user, he/she would experience an actual conference, using VAXNotes. During the conference, the tutorial would provide an explanation on how to use the program with a Maricopa flavor.

However, in the Fall of 1990, Digital Equipment Corporation, (DEC) announced that the next version of All-in-1 (2.4). VAXNotes would be included as one of its modules. The committee felt that proceeding further in writing documentation on the current version of VAXNotes would be counter-productive, since its user interface would change dramatically. Thus, the change would render our work obsolete. For this reason, the committee went into hiatus in December. As of this report, Information Technologies Services Department has received All-in-1 2.4, and is evaluating it, but has not yet projected an installation schedule.

This spring, the Ocotillo Library Users Group subcommittee brought in a speaker, and invited Maricopa personnel to workshops on using BITNET and Internet, which are world wide networks available to Maricopa. There is no support on network usage available to these users. It was decided that VAXNotes be used to try and provide such support, as well as a place for these "networking pioneers" to share their experiences.

A one-page "cheat sheet" on VAXNotes was prepared and users in those workshops were given an introduction to the program. Members of the Administrative Computer Conferencing Committee are currently monitoring those conferences to provide user support, as well as to evaluate how inexperienced users assimilate to VAXNotes. This experience will be beneficial to the committee when it reconvenes to write user documentation once the new version is in place.

As an off-shoot of this committee, the HyperCard Electronic Forum was developed. Under the leadership of Don Snow and Chris Zagar, a prototype Electronic Forum for HyperCard Developers has provided information on protocols and procedures that are important in forming and implementing conferences.

Introduction

In this district, HyperCard is a widely used programming system and those using it vary greatly in expertise. While programming, exchange of information with colleagues is extremely useful. Those with more experience can help beginners with problems, useful subroutines and utility programs can be shared, etc.

Also, in the district, there is interest in exploring possible applications of computer conferencing. Educational applications involving students are currently being explored by Karen Schwalm and Chris Zagar. Another possible application is for communication among faculty and staff who have a common interest. HyperCard as a topic seemed to be good choice for exploring the usefulness of this idea.

Therefore, the HyperCard forum was set up with two goals: to aid in the exchange of information among those interested in using HyperCard and to explore the potentials of the medium. Procedures and protocols developed would be used to improve the efficiency and potential for success of future forums on other topics.

Procedure

A memo was sent asking who might be interested. Eighty-eight (88) indicated interest. Then since a significant number had no experience with the electronic forum (EF), I created a hard copy version of "HELP" and a manual. These were sent to everyone. However, only 36 ever signed on and only 22 entries were made. This was despite some prodding on my part. Due to the lack of activity and in order to justify my time, I became involved in being the campus administrator and consultant for the classroom forums and I participated in the forums on the other campuses. I learned a great deal about the dynamics of forums and possible reasons for the lack of activity in the HyperCard forum.

Conclusions

Apparently the time is not quite ripe for this type of forum. Due to the lack of activity, no procedures or protocols could be developed. It appears that in order for a forum to be active, members must check in frequently to see if there are any entries. Either no one had enough time or the interest and motivation was not enough. Also, there was not much interest in initiating entries. Maybe there will be less of a problem when the extra steps for jumping across nodes are not necessary and a message will appear that there are new entries like in A1. Chris Zagar informs me that steps are being taken in that direction.

Also, experience with the classroom forums has shown (the behaviors of faculty and students were indistinguishable) that a long manual will not be used. A quick reference card will probably be more successful.

Future Goals

The time might not be quite ripe, but I believe it is close. The potential is there. It does require a change in people's habits. People still automatically pick up the phone and call me with a HyperCard question instead of asking the question as an entry in the forum where the potential for an answer is greater.

I will continue to keep the forum open through the summer and next year. So far I have not intervened much in order to see what would happen naturally. In the future I will try and stimulate activity by contributing entries of general interest.

Don Snow, SCC
HyperCard Forum Project Manager

DISCIPLINE DIALOGUES

BY: John Mildrew, SMCC
Jon Travis, DIST

CHARGE:

Identify discipline groups for dialogues, and work with the leadership of those groups in planning and hosting discipline dialogue meetings.

Background

Ocotillo's 1989-90 Teaching and Learning Group successfully established a forum for stimulating professional discussion concerning the teaching and learning goals, challenges, and innovations of each particular discipline here at Maricopa. The design of Discipline Dialogues emerged from the belief that if technology is to be incorporated into the classroom, faculty first need to understand its relevance to their own needs in their own areas of instruction and that both inter- and intra-disciplinary faculty sharing is crucial for the educational experience we provide students.

The **goals** for the Discipline Dialogues included:

- To provide opportunities for intellectual and professional conversations among colleagues
- To support and enhance educational programs
- To share information and developments in the field
- To study literature and concepts which are of central importance to the discipline
- To explore issues of local, regional, national, and international concern related to the subjects taught
- To focus on the processes by which students learn

The **objectives** set forth by the Teaching and Learning Group in 1989-90 for these Dialogues included:

- To create opportunities for Maricopa faculty to build networks with faculty in other institutions
- To create an environment for interesting ideas, projects, and activities
- To support faculty leadership within disciplines related to excellence in teaching and learning
- To clarify the kinds and levels of support that faculty can expect from the Maricopa Center for Learning and Instruction and the Office of Faculty/Staff Development

Year In Review

The 1990-91 Dialogues were planned by Instructional Council representatives from the colleges as well as Ocotillo Discipline Dialogue group leaders and staff who facilitated and provided support for the overall planning process. In 1989-90, three pilot Dialogues were scheduled: English, Math, and Science. However, the Math and Science planning committees decided to merge their discussion groups since so many issues were interrelated.

The 1990-91 Ocotillo project altered the Teaching and Learning group, which had fostered Discipline Dialogues to assign a group status to the Dialogues. In addition, the original Dialogues were expanded to include three more in 1990-91. The original three disciplines were given the option of continuing their Dialogues and other disciplines were asked to submit proposals for new Dialogues. English, Math, and Science all opted to continue. Math and Science once again chose to work together, with the addition of the Engineering discipline. The remaining three Dialogues were awarded to Psychology, Communication, and Business.

The format which was chosen by planning committee leaders was relatively informal but with some minimum structure. This minimum structure allowed for a creative and meaningful professional growth experience for faculty. While most workshops consisted of a series of guest speakers giving addresses about teaching, this unique professional growth project realized that there is an abundance of "expertise" among our own faculty. When faculty were given the opportunity to plan their own development projects, they appeared to value collaboration and realized the importance of networking with their colleagues in order to improve their teaching skills.

Each of the Dialogues included lunch for all participants, followed by participation in special interest group topic discussions that were designated by the planning committee. Although technology was not an explicit part of their agenda, these Dialogues naturally evolved with technologically-related concerns. Specific Dialogue activities are descibed as follows.

English Dialogue Day

- Collaborative Learning
- Computers in Composition
- English 101 & 102
- ESL (English as a Second Language)
- Learning Communities
- Literature
- Motivating and Retaining Basic Skills Students
- Speciality Writing Courses: Technical Writing and Creative Writing

Of the 120 full and part-time faculty invited to the English Dialogue, 90 participated and reacted with overwhelming praise for both the opportunity for interaction and the day's planning. The group also cited the benefits derived from the topics discussed during the afternoon. The English Instructional Council implemented a discussion format this year that placed the emphasis on group interaction, rather than individual presentations, a format picked up by the Math/Science/Engineering planning group as well. Speakers lecturing or demonstrating for the small groups in each session were not considered by the English Instructional Council to be as interesting or as useful as a general, informal discussion. While each session included a facilitator who initiated the discussion, he/she was not expected to control the interaction. The intent was to foster more sharing among faculty and create more of a collegial atmosphere within the discipline. Judging from the response of the English faculty who participated, this format was indeed successful.

Communication Dialogue Day

- Communication as a Core requirement
- Electronic Journals

The articulation issue of a Communication requirement being excluded from the Transfer General Education Core Curriculum was seen by the discipline to be a topic of the utmost urgency. While the TGECC includes six (6) to nine (9) hours of required writing credit, the communication and reading course work are optional. Support of a Communication requirement for degrees by the four-year colleges is needed, according to the discipline leadership. The viability of Maricopa's Communication departments may depend upon such a requirement. The significance of this topic made the Communication Discipline Dialogue an extremely vital opportunity for the Communication discipline.

Math/Science/Engineering Dialogue Day

- Integrated Science
- Math Reinforcement Skills in the Sciences/Advanced Math Skills
- Software/New Resources
- Electronic Journal
- English Issues Impacting Math/Science/Engineering: ESL, Technical Writing, and Reading
- Math Prerequisites for Science

As indicated above, the Math/Science/Engineering planning group utilized a similar format for its Dialogue as the English group used. The interrelatedness of the three disciplines was a key feature of the discussion. The potential for an integrated program of course offerings was discussed, especially in light of such a program under development at Phoenix College. Another significant issue which seemed to require immediate attention was that of standards for student use of technology, especially in examinations which evaluate mathematics skills. Kicking off the day's discussion was a short keynote address by Scott Flansberg, a local consultant who has achieved a reputation as a human calculator.

Psychology Dialogue Day

- Innovative Programs: currently in use in MCCCD psychology classrooms
- New Software and Hardware
- Tours of GCC's Electronic Classroom (the "classroom of the future")
- Potential of Technology in Psychology Classrooms

The Psychology Ocotillo Discipline Dialogue Day, "Psychology and Technology: Where Are We, What's Available, Where Are We Going With It?" provided district psychology faculty an excellent vehicle to engage in exploration, discussion, debate, and dialogue in the role technology plays in the TEACHING AND LEARNING of Psychology. Exemplary models of innovative programs developed by faculty were presented. In addition to viewing demonstrations by hardware/software vendors, faculty actively participated in a wrap-up dialogue with the nationally recognized guest speaker, Dr. Carole Wade (formerly with *Psychology Today*; "Assuring Academic Quality and Credibility In Offering Psychology Through Technology") and Mr. Ron Bleed, MCCC Vice-Chancellor of Informational Technologies ("Where We Are Going In Technology As A District"). Because of the success of this faculty-initiated program, future dialogues may include a state-wide psychology community college faculty OCOTILLO DIALOGUE sponsored by the Psychology Instructional Council.

Business Dialogue Day

- Economic Development in Arizona
- Economic Development in the Nation

The intent of the discussion for the Business Dialogue was to focus on the impact Business Departments at the colleges may have on economic development issues.

Future Goals

Considering the tremendously favorable response each of the above Dialogues has received from participating faculty, the Discipline Dialogue leadership is anticipating a continuation of each of these discussions during the next school year, pending funding approval by the Ocotillo leadership. In addition, the Staff Development Coordinators have reiterated their support of Discipline Dialogues by expressing in their strategic plan (currently under development) their desire to maintain the ongoing Dialogues, with the addition of two more Dialogues in 1991-92. Clearly, Ocotillo has fostered a uniquely viable method for enhancing effective teaching and learning.

Electronic Forms and Approvals

OPPS!

BY: Ken Roberts, PVCC
Nonie Bernard, DIST

CHARGE:

Continue with the work of last year's group and develop a plan for including other forms for electronic approval.

Background

The Ocotillo Task Group on Automated Forms and Approvals concluded its 1989–90 status report by making three recommendations. The recommendations were:

- The automated posting request system (PRS) should be tested fully, and the group should monitor feedback regarding its use. Problems associated with using the system should be identified and addressed.
- A priority list should be established and maintained, in cooperation with the technology users groups, for automating systems within the district.
- The task group should continue to exist for the purposes of identifying areas of need within the district and discussing concerns and developments in the area of automated forms and on-line approvals.

Year In Review

For the 1990–91 academic year, the Ocotillo Task Group on Automated Forms and Approvals relied upon these recommendations as a general guideline for shaping the activities for the year. It should be noted that the Task Group on Automated Forms and Approvals has taken upon itself a focus of facilitating the development of products and related procedures. The task group has evolved, over time to become product oriented; the members did not seem to be content to discuss areas in which paper procedures can be replaced by automated protocols. Significant time was spent this year with the final revision and field testing of the product developed last year, the Automated Posting Request System.

Progress on the Automated Posting Request System (PRS)

The first major task requiring attention during the 1990–91 year was the revision and final field test of the Automated Posting Request System (PRS), which had been developed during the preceding year. While PRS had been developed during the 1989–90 year, it had not been field tested by actual users, nor had user documentation been developed. It was felt important that the system be field tested, since feedback from the system users would be valuable in guiding any future development efforts. As a result the task group wanted to complete a full field test of PRS before moving to other developments.

The Automated Posting Request System (PRS) was developed to serve two primary needs: (a) to reduce paper and (b) to reduce the time required to process a request to post a vacant position within MCCCD. The system was developed to accommodate three broad features: (a) it could be accessed easily from the current A1 system; (b) the computer screens used would closely match the current paper forms; and (c) the system would provide immediate status of the posting request.

The employees involved in the PRS procedure include: (a) requester or initiator; (b) college president, center provost, or district vice chancellor; (c) district budget officer; (d) wage and salary manager; (e) employee relations manager; (f) employment officer; and (g) system manager/prime user (district person responsible for security of and access to the system). When PRS is used, the computer generates and delivers A-1 messages as follows:

- A message is sent, requesting the responsible person to interrogate the system regarding a position requested.
- If no action is taken by the person above, a reminder message is sent daily.
- A message is sent to the initiator, informing him/her that a reminder message was sent.
- A denial message is sent to the initiator if any responsible signer responds with a "no" on screen 3 (this terminates any further messages).
- When the request is finalized, a message is sent to the initiator and a completed copy of the posting request form is sent to the initiator and the employment officer.

- If a responsible person wants others to be sent the same messages he receives, then a distribution list can be set up via the password file. This is helpful if the responsible person is not available for a period of time and someone else is taking over his/her duties.

The Automated PRS directly follows the process and sequence of events of the current paper system. However, it provides direct feedback regarding the status of a posting request and affords instant status information. A complete description of PRS, including a description of the data files and procedures for use, is contained in the 1989–90 Ocotillo *Interim Report.*

During early 1990–91, the Automated Posting Request System was tested in a controlled environment at the district office. Following this field test, minor revisions were made to the system. During the 1991 spring semester, PRS is being field tested at Mesa Community College and Paradise Valley Community College. Both colleges will use PRS to request posting for all their vacant positions during the field test and they will parallel the test with the traditional paper process.

User documentation has been developed to support PRS, and on-site training of the appropriate MCC and PVCC staff members has been completed. Attached to this report is a copy of the *Automated Posting Request System User's Guide.*

Initial reports indicate that the Automated Posting Request System has been accepted by the college users. Users have reported that PRS is easy to use and provides timely information regarding the status of posting requests.

As an indication of the efficiency of the Automated Posting Request System, the following comparison should be noted. During the field test, a posting request using PRS was completed within one day. That is, the request was submitted electronically, received budget office, wage and salary office, employee relations office, and employment office approvals, and was ready for posting within a few hours. A back-up paper system was used during the field test. Due to the delays that typically result in the routing of paper to various offices via inter-campus mail, the following A1 memo was received by the requester three days after the posting request was initially mailed: "Your posting request has been received. We will be routing the posting request through the district office and the wage and salary/employee relations office for approval signatures. Barring a delay at one of these offices, we will post your position internally in the next available Transfer Opportunities." This scenario does not imply that the current system is ineffective, but rather that an automated system simply results in more timely responses and is less prone to misrouting. Using PRS, the posting request was approved within hours. Had there been any questions about the request, information would have been immediately available and could have been clarified just as quickly.

There will be a broad review of the field test as soon as MCC and PVCC complete the posting of their positions. The review will include interviews with the parties involved to determine any concerns with the system. In addition, discussion will be held to determine whether it will be possible to move PRS to broad district-wide use.

Cooperation with Technology Users Groups

Technological development and computer-programming support for the Maricopa Community College District is provided by the Information Technologies Services (ITS) Division, under the direction of Ron Bleed, Vice Chancellor for information Technologies Services. In order to determine user needs and their relative priorities, ITS utilizes technology users groups, made up mainly of non-ITS employees who serve common functions or share technological resources. Some examples are: FRS, HRS, SIS, and telecommunication users groups. These groups provide input to ITS, and ITS responds within time and budget limitations.

The users groups determine priorities of project requests within their areas and ITS acts on project requests that have been given priority by the users groups. The Automated Posting Request System project was given high priority by the Human Resource System (HRS) users group. By giving PRS high priority, other project requests were relegated to lower priority status. It is important to note that the decision was made by the members of the users group, not by the Ocotillo task group members nor by any ITS staff members.

Because of the nature of its charge and the determination of its members to develop products as well as ideas, any project that the Task Group on Automated Forms and Approvals undertakes in the future will require coordination and/or involvement with one or more technology users groups. Any project that requires programming and development time or money will be in direct competition with other projects already identified by users-group members.

Identifying Future Areas of Need for Automated Forms and On-Line Approvals

Concurrent with the field test of the Automated Posting Request System, there has been discussion about the next automated project. As in previous years, there was some discussion regarding district-wide paper processes and procedures that could be implemented using automated systems. One area that all task group members felt worthy of consideration was the employee absence reporting form.

The idea of automating the employee absence reporting process was unanimously favored as our next project. The process was selected due to the large volume of paper generated, the importance of timely information, and the time impact the reporting process currently has upon employees district-wide.

Members of the task group met with Van Bradshaw, Supervisor of the District Employee Benefits department, to discuss the possible advantages and disadvantages of automating the absence reporting system. Van provided, from his point of view, an overview of the current procedures and inherent problems. Van also discussed several concerns that would need to be addressed should the reporting procedure be automated. There was broad discussion regarding the format of an automated employee absence reporting system and how such a system could be used to increase the timeliness and accuracy of employee vacation and sick-leave data.

At this time, there appears to be interest in moving forward with the automation of the employee absence report form as a project. However, before any formal action is taken, the involvement of the HRS users group and ITS leadership will be necessary in order to determine whether programming support for such a project can be made available. In addition, the group will want to carefully evaluate the results of the PRS field test, as many of the same design features would be required in automating the absence report forms. Initial discussions have taken place and, should the project move to the development sage, field-test locations at the district office and Rio Salado Community College have been identified.

Future Goals

For the coming year, members of the Ocotillo Task Group on Automated Forms and Approvals will want to carefully evaluate the field test of the Automated Posting Request System. In addition to the review, the group will need to determine the steps necessary for district-wide adoption of the system. During the development of PRS, there was close contact with the human resources and business offices to insure their acceptance of the final product. However, district-wide adoption will require introduction at each of the district colleges.

It seems that, before any future development efforts can take place, the task group must develop a process to insure that development efforts can result in district-wide adoption of products produced. While the group can, in isolation, identify systems that could be automated, it is inappropriate to proceed with such development if there is the not district-wide interest and willingness to proceed with implementation upon presentation of finished products. The group is proceeding in this direction and has been involved in initial discussion with appropriate personnel regarding the automation of the employee absence reporting process. However, the discussion must extend to include input from the ultimate users of any system proposed and perhaps developed. For next year, this process will need to continue and expand, in order to insure that products developed are, in fact, useful.

In addition to discussing the process of product adoption, the task group must develop a process to secure the monetary and personnel resources needed to complete development efforts. A programming project as large as the automation of the employee absence reporting form could not realistically be expected to be given top priority by the HRS users group, as it would preclude ITS attention to other HR projects for at least several months. To date, the group has received high levels of support from Ron Bleed, his staff, and the technology users groups. However, we cannot expect this to continue without some formal process in place.

InStRuCtIoNaL CoMpUtEr CoNfErEnCiNg

By: Karen Schwalm, GCC
Shirley Lowman, DIST

CHARGE:

Work at developing/enhancing systems which support instructional computer conferences with student-student, student-faculty, and student-materials interactions. Also, promote the use of computer conference among faculty district-wide.

Background

Computer conferencing as a tool for instruction was developed and piloted at GCC by Karen Schwalm, an English instructor. Karen also provided assistance to interested faculty throughout the district in establishing such forums for their students and classes.

Year in Review

The Instructional Computer Conferencing Subcommittee (ICC) had two formal meetings this year. During the first meeting, participants determined that they wanted to explore three kinds of computer conferencing: local programs (specifically the Electronic Forum), commercial resources (like Prodigy or Compuserve), and academic resources (like Isaac and BITNET). At our second meeting, we discussed (and demonstrated) the Electronic Forum and some BITNET lists. We quickly realized that it is more difficult to learn how to use BITNET than it is to learn how to use the Electronic Forum.

Network Access

Several Ocotillo groups have talked about network (BITNET and Internet) access this year, each from a different perspective depending on the focus of the committee. The ICC has concentrated on the instructional uses of networks, but we discovered that identifying and promoting uses for BITNET in the classroom really has to wait until more faculty members become regular network users themselves. However, some exploration has begun.

This year, the instructional uses of BITNET have been limited primarily to information diffusion. At PC, Jim Walters and Billie Hughes have selected entries from a number of lists and moved them into two different forums so members could read them. During the fall semester, Jim helped a student in an honors class query a BITNET list about environmental issues, but the student worked "through" the faculty member's account. At GCC, I transferred 44 entries written for members of the Humanist list (by two people in Israel during the Gulf war) into the Dialogue Forum. A number of students asked if they could respond to these entries, so we think students would be interested in the communication made possible by BITNET.

A BITNET Users Group (BUG) began this year on GCC's EF to help students learn about BITNET. Many of its members (faculty, staff, and students) know a lot about networks, and they are very quick to answer questions. In addition, they have established a sub-forum (BITNET User Files or BUF) to share BITNET files, an effort to manage VAX resources more effectively. However, not many people know about BUG because it is not an "open" forum. People learn about the forum by word of mouth, and then they have to request membership.

We are currently exploring the possibilities of using BITNET or Internet to link composition class with partners in Michigan, Kansas, Florida and Arizona. Even if we cannot work out all the details to link synchronously, we will be able to communicate asynchronously. However, some additional revisions to the Electronic Forum will be necessary to make outgoing communication from within a class journal easy.

Several BITNET lists exist that might be of general interest across the district because they encourage discussion of computer-mediated communication. EDTECH (EDTECH@OHSTVMA) supports discussion of educational technology in general; EDUTEL (EDUTEL@RPIECS) on Comserv concentrates specifically on communication issues and information technologies. Both groups discuss distance education. A list also exists for the discussion of HyperCard (HYPERCRD@PURCCVM). Subscribing to these lists is easy. As several people from MCCCD currently belong to each of them, we are thinking about making them generally available, either through the Electronic Forum or through VaxNotes.

The Electronic Forum

Faculty members at every college across the district are now using Electronic Journals in their classes. As of April, nearly 100 class journals were operating in over 30 different courses in 21 different subject areas. (At least two of these class journals required cross-institution collaboration. PVCC's journal and one in a graduate course at ASU West make use of GCC's Electronic Forum.) Forum use increases daily, as we have found that journals can be effectively incorporated into classes at any time during the semester. For example, three Engineering journals began this month at GCC to support end-of-semester projects.

In addition to these course-related uses, 30 different interest group or committees have used the Forum as a means of accomplishing their work or sharing information. Different colleges "host" these forums: a discussion of Project Jefferson occurs at MCC; a discussion of HyperCard occurs at SCC; a discussion for members of the Great Teachers Seminar was begun at GCC. [In fact, this committee did some of its work electronically.] Because the membership in these groups is determined by individual forum administrators, many people don't even know they exist. (Only the forums which people are free to join appear on the screen when they type "show forums.")

An additional 16 open forums (whose membership is user-initiated) exist to support discussion on a variety of topics at various colleges. For instance, a Film Forum opened at MCC, a Gulf Forum began at PC, and the COPE Forum (run by the counseling department) began this spring at GCC. The most recent open forum (Math) was begun by the GCC Math Department to support Math Awareness Month. Five colleges have added Private Mail to their forums, allowing students to communicate privately with each other or with faculty members.

As of April 1, 1991, some 4800 students, faculty, and staff had been members of Electronic Forums somewhere in the district. We think this number represents "critical mass." The Forum is poised for rich and rapid expansion at every college next fall.

If use is any indicator, faculty and students across the disciplines think that computer conferencing benefits their teaching and learning. To examine this belief more closely, we have submitted a grant proposal to FIPSE (the Fund for the Improvement of Post Secondary Education) requesting over $300,000 to study the social and academic effects of Electronic Journals on students. If we get the grant, we intend to do three things. First we hope to refine the Electronic Forum (both software and support materials) to make it even easier for faculty and students to use. Secondly, we plan to identify and disseminate to teachers specific instructional strategies that seem to work in class journals. Finally, we want to explore what kind of social benefits computer conferencing might have for community college students. Because the forum is being used so widely across the district, we think the research supported by the grant would have broad application.

Even though the software is essentially the same district-wide, the Electronic Forum operates independently at local colleges. Each college has at least two "leaders," a faculty member (usually the first faculty member to incorporate journals into a class) and a computer services representative. This dual-ladder structure encourages three kinds of communication: among faculty on instructional issues, among computer services personnel on technical issues, and among members from a single college on policy issues. These "college leaders" form the initial membership of the Electronic Forum Steering Committee which will meet for the first time in April.

A number of promotional efforts for the Electronic Forum have been supported by Ocotillo this year. Electronic Journals have been a topic for formal discussion at two Discipline Dialogue Days--Communication and Math/Science/Engineering. Their use was also discussed in a number of sessions at the English Discipline Dialogue Day. In addition, Chris Zagar and I have organized presentations or workshops for nearly 100 faculty members or staff people on 8 of the 10 colleges.

While these efforts can build initial interest in Electronic Journals, the really effective support takes place on the individual colleges. Most colleges have established a forum (named either ForAdd or Admins) to support faculty who are administering class journals. While the forum administrator at each college moderates these discussions, we have found that as more faculty become knowledgeable about the software, they become the ones to answer the questions posed by newcomers. Questions and answers can be deleted selectively at the end of each semester, but having a record of questions (and their answers) has helped us write and revise the instructional materials we provide faculty (and students).

These materials--the Faculty Support Folders and the Beginner's Guide to the Electronic Forum--have been revised over the past year in a number of ways. We have provided the text of the Beginner's Guide to each college (on disk, in both MAC and MS-DOS formats) and encouraged modification. (Each college has different prompts, different log on procedures, and different dial-up numbers). We are collecting copies of these different versions because they often contain improvements that we can share with each other. We are also beginning to share copies of "Getting Started" materials that faculty produce for classroom use, again because they reveal improved layout or language that makes introducing students to the Electronic Forum easier. Faculty Support Folders contain instructions and suggestions for using Electronic Journals as well as a selection of discipline-specific journal articles on writing-for-learning or computer conferencing. These materials work well, but several ideas for improvement are beginning to surface.

Future Goals

If we are going to encourage the widespread use of electronic communication in instruction, we need to discuss a number of difficult issues related to resources. We anticipate that the subject will be explored by the Forum Steering Committee, but it needs to be addressed thoroughly by Ocotillo as a whole. Ultimately, we need a policy statement that reflects our commitment to instructional computer conferencing.

Encouraging faculty and students to use electronic communication has the potential to increase VAX demand dramatically. The Electronic Forum easily can become the largest single user on any college VAX (primarily because 90% of the users enter through a single "account"). At GCC, we are particularly aware of our impact on VAX use, but at smaller colleges, the effect could be astonishing. We are tracking EF use closely, trying to establish patterns of use, peak times, and accurate numbers that will help us make appropriate policy decisions. (Currently, the EF is one of the top five users of GCC's VAX, but still it accounts for only 3% of total CPU time.)

In addition to CPU time, the Forum uses other kinds of computing resources. At each college, a line on the screen shows how much of the allocated disk space the forum is using, and we have established a "counter" at GCC to record how many pages have been sent to the printer. Increased use will also affect access to dial-up lines and to seats at terminals. If we encourage additional student and faculty BITNET use, demand for all these resources will multiply accordingly.

Increased use of electronic communication (whether EF or BITNET) has a significant effect on the workloads of support personnel. We need to write hardcopy manuals and instruction sheets (an extremely difficult task for BITNET as commands differ according to machine, software, and college). We also need to translate on-line help menus into language that new users can understand. We need to provide effective local human assistance: workers to answer questions in the lab, faculty to work with colleagues in their offices, computer services staff to troubleshoot technical problems. With electronic communication, people can have problems or questions 24 hours a day, 7 days a week. How will we provide appropriate assistance? Who will teach these workshops and classes?

If we expand electronic communication at colleges across the district, how much time and money will we have to support key leaders at each college and at the district? Computer services personnel cannot just "add on" the Electronic Forum or BITNET to their already heavy workloads; supporting expansion of these uses needs to be identified as a clear job responsibility, and specific amounts of time need to be allocated for materials development, user support, and on-line maintenance. If network or forum use is heavy, a full-time position (either faculty or staff) at the district and at each college may be necessary. Where will the money come to pay for these people, especially in a time of increasingly tight budgets?

Faculty members also need substantial support (and rewards) if they are going to incorporate electronic communication into instruction. We know that it is most effective to have faculty members help each other, but promoting and supporting new users of BITNET or Electronic Journals can take as much time as advising students. A number of mechanisms can be employed: reassigned time, advancement credit for training workshops (both given and taken), and committee assignments for BITNET or the EF. If network or forum use is heavy, a college might need to appoint a full-time faculty leader (supplemented by additional faculty members who have reassigned time or whose committee assignment is BITNET or Forum support). This is a leadership issue as well as a budgetary one.

A number of mechanisms can help individual faculty members incorporate electronic communication into instruction. First, the necessary training has to be readily available (workshops, one-on-one help, manuals) when and where the faculty member needs it. Insofar as it is possible, such training should be provided by faculty from the same general discipline area because frequently technical and discipline specific knowledge overlap. Secondly, such additional education needs to be rewarded. We need to provide advancement on the salary scale or additional compensation for faculty learning how to use new instructional technologies. How can we reallocate responsibilities, rather than increase them? Finally, we must make it easy for all faculty to incorporate electronic communication into their classes in a variety of ways. The imposition of additional fees for BITNET or Forum access does significant damage to faculty willingness to experiment, not only because of the financial impact on students but also because of the lead time required for schedule printing.

Electronic conferencing can increase the accessibility of visiting faculty as well. It can provide them with a "virtual" office where they can communicate with students as well as with colleagues. However, we do not routinely provide visiting staff with Vax accounts, we do not encourage them to learn new instructional technologies nor reward them when they do, and we have no equipment to loan them for home use.

Because computer conferencing can supplement rather than replace traditional forms of instruction, it has significant potential for broadening computer use across the college community. Thus, it promises to have equally significant financial impact on college and district budgets. The funding potential for broadening computer use across the college community. Thus, it promises to have equally significant financial impact on college and district budgets. The funding issue is neither fun nor easy to discuss, but how we answer the question of who pays for computer conferencing capabilities--the student, the department, the college, or the district--will have the greatest effect on how this instructional tool develops at MCCCD.

Many people have worked diligently this year to expand the uses of the Electronic Forum to support teaching and learning. every college. It is the mechanism for discussions among part-time faculty, full-time faculty, new faculty, and among members of individual departments. Different groups of students use the forum to communicate with each other and with other members of the college community. We are ready to expand at each college, into new disciplines, for new instructional uses. What we need is a clear and enthusiastic endorsement from Ocotillo, from the district, and from college administrators and computer services personnel.

Electronic Forum -- Activity Summary -- April 1, 1991

There were 76 class journals operating during the Spring Semester (1991) in 29 different courses in 20 different subject areas.

There were 30 different interest groups or committees meeting.

There were 16 different user-initiated forums on 7 different colleges.

Two colleges and ASU West were participating in cross-college collaborative efforts with GCC.

The Electronic Forum had approximately 4800 members across the District as of April 1, 1991.

Class Journals (Spring Semester, 1991) [76 sections]

Administration of Justice [GC]
Anthropology 102 [RIO]
Biology Discussion [PC]
Biology 079 [GC]
Biology 102 [GC (2)]
Biology 181 [GC]
General Chemistry I [PC]
Child and Family Studies [GC (5)]
Classics [PC]
College Algebra Forum [PC]
Communications 110 [GC (3)]
Communications 225 [SCC (2)]
Communications 230 [SCC (4), PC (1)]
Curriculum [ASU West with GC]
Economics [PC]
Engineering Science 106 [GC (6)]
English 061 [GC (4)]
English 071 [GC (1)]
English 101 [MCC (6), PC (4), GC (3), SCC (1)]
English 102 [RIO (1), MCC (3), GC (3), PVCC (1), SCC (1)]
English Humanities [GC (1)]
Humanities [PC (2), SMC (2)]
Library Skills [PC]
Medical Ethics [PC]
OAS 1 Word Processing [PC]
Physics 112 [CGCC]
Reading 101 [GC (4)]
Reading 104 [GC (1)]
Ethical Situations for Interpreters for the Deaf [PC]

Interest Groups or Committees (Spring, 1991) [30 groups]

Advisory Committee [GC]
BITNET Users Group [GC]
Classroom Research Group [PC]
Computerized Automobile Records System Feedback [GC]
Electronic Communication [GC]
Estrella Mountain College Adjunct Faculty [GC]
Forum Administrators [CGCC, SCC, PC, GC]
Great Teachers Seminar Forum [GC]
Honors Forum [PC, SMC, GC]
Honors Hotline [PC]
HyperCard Forum [SCC]
Information Services [GC]
Instructional Associates Forum [GC]
Instructional Computer Conferencing (Ocotillo Sub-group) [GC]
New Faculty Forum [PC]
Open Entry Faculty Forum [PC]
Project Jefferson [MC]
Staff Development Team [CGCC]
Test Forums for Biology [GC], English [GC]
Test forums for general faculty [CGCC, SCC, GC, GWC, PVCC]

User-Initiated Forums

COPE--Support Groups for Personal Concerns [GC]
Dialogue--Thoughtful Discussion [GC]
EF--Electronic Forum Feedback Forum [GC]
Film Forum [MCC]
GULF--A Discussion of the War [PC]
Mail [RIO, MCC, SMC, SC, GC]
Math Forum [GC]
Public Discussion [GC]
Science Club Topics [PC]
Technical Forum [GC]
Test Forums for all users [RIO, PC]

Prior Semesters (Additional Courses)
Interior Design [SCC]
Psychology 101 [GC]

District Summary (Start-up Dates)

Glendale Community College (August, 1989)
South Mountain Community College (January, 1990)
Phoenix College (August, 1990)
Scottsdale Community College (October, 1990)
Mesa Community College (January, 1991)
Paradise Valley Community College (January, 1991)
Rio Salado Community College (January, 1991)
Estrella Mountain Community College Center (February, 1991)
Chandler-Gilbert Community College Center (February, 1991)
Gateway Community College (March 15, 1991)

ASU West Cross-institution collaboration (February, 1991)

LIBRARY USERS GROUP

By: Toni Rodriguez, RSCC
Laurita Moore de Diaz, DIST

CHARGE:

Work closely with librarians to provide information on the instructional direction that the District needs to take to make information usable to our students in the learning environment. Included would be information on database acquisition and possible ways to save library searches in electronic form.

Background

The Library Users Group has replaced the Library Issues Group to focus attention on the users of the library. This group has provided the first formal forum for classroom faculty to add to the group process associated with the information literacy movement.

Year in Review

Rapid and tremendous strides are being made in the technology used for storing, organizing and accessing the ever-expanding information base. Having information technology in place, however, does not guarantee increased research productivity. It is up to faculty to foster the new approaches to learning that will result in the production of independent life-long learners. This will depend on faculty changing their information gathering patterns to incorporate the powerful, new tools now available. Knowledge is the key to this transition. Faculty must know what resources are available and how to search and retrieve information from the new technology.

This year, the Library Users Group focused on increasing faculty knowledge in the area of information technology. Many faculty members do not know of available information resources, nor have the skills necessary to search and retrieve information from computer systems. The development of the Online and CD-ROM Database Catalogue and production of the BITNET/Internet workshop helped provide useful information for faculty in these areas.

Introduction

The volume of information, available in a growing array of formats is expanding at an unprecedented rate. Information learned today in class will be largely out-of-date before a student enters the work force. Traditional teaching methods based on lectures, textbooks and memorization do not prepare a student to function in this age of information.

The idea of literacy must be expanded to include information literacy. Students must be prepared for lifelong learning. The information literate student will know when information is necessary and will have the skills required to locate, access and use appropriate information. This new approach to teaching and learning requires a link between the library and the classroom. Faculty and librarians must work together to close the classroom/library gap. Through their coordinated effort faculty and librarians can provide a higher quality of learning can occur which will prepare students for life long learning and active citizenship.

The Library Users Group has established the following objectives in keeping with their charge from the District:

- Be a resource for providing faculty and student feedback on issues related to library usage.
- Keep faculty abreast of the rapidly changing information base available for classroom instruction and professional growth.
- Provide feedback on what faculty and students want in the area of database and information retrieval technology.
- Support endeavors aimed at helping students become self-directed learners by utilizing electronic databases that will locate and retrieve the information required to meet their academic goals.

Development of a Catalogue for Online and CD-ROM Databases Throughout the District

This catalogue is a compilation of electronic databases in the district. It is the first step in the Library Users Group's plan to make faculty and students more aware of library resources. The final project, designed and edited by Sue Thomas of GateWay Community College, is documented and stored in a way to simplify future updates of the information. The Library Users Group would like to thank the district librarians who played a major role in completion of the project.

DESCRIPTION OF ONLINE AND CD-ROM DATABASES

BOOKS IN PRINT

The Books in Print database gives users access to books published or exclusively distributed in the United States. The database includes scholarly, popular, adult, juvenile, reprint, and all other types of books covering all subjects, in addition to book reviews.

College locations: MCC, MCLI, SMCC.

COMPTON'S MULTIMEDIA ENCYCLOPEDIA

Compton's Multimedia Encyclopedia has 32,000 articles, 15,000 images maps, and graphs and the entire Merriam-Webster Intermediate Dictionary. There are sixty minutes of sound, music and speech with 45 animated sequences. Eight hundred full-color maps, five hundred charts and diagrams.

College location: PC.

DATATIMES

DATATIMES is an online database of 650 different sources of information that includes, magazines, financial information, stocks, company, and industry information. There are 60 regional newspapers, 8 Canadian newspapers and other sources from Europe, Asia, and Australia. Local newspapers include the *Arizona Daily Star*, *Phoenix Gazette*, *Arizona Republic*, *Arizona Business Gazette*, the *Tuscon Citizen*, and the *Arizona Republic*. The database is updated every 24 hours and there is a fee for its use.

College locations: GCC, SMCC, MCC.

DIALOG

DIALOG Information Services has more than 350 databases covering all areas of science, technology, business, medicine, social science, current affairs, news, and humanities and the databases contain over 200 million records. Records, or units of information, can range from a directory-type listing of companies, associations, or famous people; to an in depth financial statement for a particular company; to a citation with bibliographic information and an abstract referencing a journal, conference paper, or other original source; to the complete text of a journal article. DIALOG is available 24 hours every weekday and there is a fee for its use.

College locations: CGCC, GCC, GWCC, MCC, MCLI, PVCC, SCC.

ERIC

The Educational Resources Information Center (ERIC) database is the national U. S. bibliographic database covering the literature of education. The ERIC database is comprised of two separate files: (1) Resources in Education (RIE), handling the document and report "fugitive literature", and (2) Current Index to Journals in Education (CIJE), handling the published journal article literature, as contained in over 775 major education-related serial/periodicals and thousands of research reports, evaluations studies, curriculum guides and lesson plans.

College locations: GCC, PVCC, SMCC, MCLI.

GROLIER'S ACADEMIC AMERICAN ENCYCLOPEDIA

The Electronic Encyclopedia contains more than 30,000 articles that are more up-to-date than a printed encyclopedia. The graphs, photographs, and maps of the printed version are missing.

College location: CGCC.

INFOTRAC

INFOTRAC is a subject-access periodical index that is also known as IAC or the Magazine Index. It is a database that indexes approximately 400 periodicals covering business and management, economics, education, social sciences, technology, and consumer affairs with references from several sources: Magazine Index, National Newspaper Index, and Business Index.

College location: GCC.

MEDLINE

MEDLINE is a bibliographic database compiled by the National Library of Medicine. Each year over 300,000 citations from 3400 medical journals are added to the database, derived from *Index Medicus*.

College location: GWCC.

NATIONAL NEWSPAPER INDEX

In-depth indexing of 5 major newspapers: the *New York Times* (late and national editions), *Wall Street Journal* (Eastern and Western Editions), *Christian Science Monitor* (National edition), *Washington Post* (final edition), and the *Los Angeles Times* (home edition).

College locations: GCC, MCC.

NEWSBANK

NewsBank has articles of research value that are selected from the newspapers and regional business publications of over 450 cities and 100 periodicals. Full text articles are on microfiche from NewsBank, Business News Bank, Names in the News, and NewsBank Review of the Arts (Art, Architecture, Film, Television, Performing Arts and Literature).

College locations: GCC, MCC, PVCC, SCC, SMCC.

NEWSPAPER ABSTRACTS ON DISC

The Newspaper Abstracts on Disc provides access to major national and regional newspapers, including the *New York Times, Atlanta Constitution, Boston Globe, Christian Science Monitor, Los Angeles Times, Wall Street Journal,* and the *Washington Post.*

College location: GCC.

OPAC

The Online Public Access Catalog (OPAC) is located in every library in the Maricopa Community College District. It lists by author, title, and subject books and reference materials located at each community college. Also included is a magazine index (IAC) that has a listing of 419 titles published since 1987 that is updated monthly. There is also access to Arizona State University's online library system (CARL). Instructions for accessing OPAC through A-1 are located on page 8. The dial-up number is 231-9305.

PERIODICAL ABSTRACTS ON DISC

Indexes 300 core general reference periodicals and provides full bibliographic citations and abstracts.

College location: MCC.

VU/TEXT

VU/TEXT was born out of a need for reporters and editors to have instant access to newspaper clippings. VU/TEXT provides database management of computerized library services for 33 out of 35 newspapers. This includes: The *Wall Street Transcript,* the *Boston Globe, Chicago Tribune, Lexington Herald-Leader,* the *Sacramento Bee,* and others. There is a fee for its use.

College location: MCC.

WILSONLINE/WILSONDISC

Wilsonline is an online information retrieval system. Wilsondisc is on CD-ROM. There are twenty-six databases, featuring 23 bibliographic databases. The databases provide information about journal articles and reviews, government publications, books and monographic, names of persons, organizations, publishers, and journals.

College locations: MCC, SCC, SMCC.

ONLINE AND CD-ROM DATABASES BY LOCATION

GATEWAY COMMUNITY COLLEGE	**DIALOG:** Online, bibliographic citations and abstract. **MEDLINE:** CD-ROM, 1988-, updated every six months. **OPAC:** Online Public Access Catalog with a magazine index and connection to ASU library.
CHANDLER-GILBERT	**DIALOG:** Online, bibliographic citations and abstract. **GROLIER'S ACADEMIC ENCYCLOPEDIA:** CD-ROM, updated annually. full text, (Located in the Mac Lab) **NEWSPAPER ABSTRACTS ON DISC:** CD-ROM, January, 1989, updated monthly. **OPAC:** Online Public Access Catalogue with magazine index and connection to ASU library.
GLENDALE COMMUNITY COLLEGE	**DIALOG:** Online, bibliographic citations and abstract. **DATATIMES:** Online, full text, updated every 24 hours. **ERIC:** CD-ROM, 1983-, abstracts. **INFOTRAC:** CD-ROM, bibliographic citations. National Newspaper Index, September, 1983- Magazine Index, past four years on CD-ROM; previous years on microfiche. **NEWSBANK LIBRARY REVIEW OF THE ARTS:** Citations and full text. 1983-. **OPAC:** Online Public Access Catalog with magazine index and connection to ASU library.
MARICOPA CENTER FOR LEARNING & INSTRUCTION (DISTRICT)	**DIALOG:** ERIC on CD-ROM, abstracts. **OPAC:** Online Public Access Catalog with magazine index and connection to ASU,

MESA COMMUNITY COLLEGE	**BOOKS IN PRINT PLUS:** CD-ROM, bibliographic citations, book reviews and updated monthly. **BUSINESS BANK:** CD-ROM, citations, 1/85-11/90. **DATATIMES:** Online, full text, Sept. 81-present, updated every 24 hours. **DIALOG:** Online, bibliographic citations and abstract. **NEWSPAPER ABSTRACTS ON DISC:** Full text and citations, updated monthly. **NEWSBANK:** CD-ROM, citations and full text on microfiche, Jan 81-Nov. 90. **OPAC:** Online Public Access Catalog with magazine index and connection to ASU. **PERIODICAL ABSTRACTS ON DISC:** Indexes 1,000 general and special academic periodicals, 1986-. **WILSONDISC:** Abstracts, updated quarterly, 1/83-12/31/90, *Readers Guide to Periodical Literature*. **VU/TEXT:** Full text, updated daily, *Arizona Republic* and *Phoenix Gazette* to 1986.
PARADISE VALLEY COMMUNITY COLLEGE	**DIALOG:** Online, bibliographic citations and abstract. **ERIC:** CD-ROM, citations, updated monthly. **NEWSBANK/BUSINESS BANK:** CD-ROM, citations, full text on microfiche, updated quarterly. **OPAC:** Online Public Access Catalog with magazine index and connection to ASU. **PARADISE VALLEY/COUNTY LIBRARY LINK:** Will be connected in 90 days.
PHOENIX COMMUNITY COLLEGE	**COMPTON'S MULTIMEDIA ENCYCLOPEDIA:** **DIALOG:** Online, bibliographic citations and abstract. **NEWSBANK/NATIONAL NEWSPAPER INDEX:** Full text on microfiche, updated monthly and cumulated quarterly and annually. **OPAC:** Online Public Access Catalog with magazine index and connection to ASU.
RIO SALADO COMMUNITY COLLEGE	**OPAC:** Online Public Access Catalog with magazine index and connection to ASU.

SCOTTSDALE COMMUNITY COLLEGE

DIALOG: Online, bibliographic citations and abstracts.
NEWSBANK: CD-ROM, citations, full text on microfiche.
OPAC: Online Public Access Catalog with magazine index and connection to ASU.
WILSONDISC: Abstracts, updated quarterly *Readers Guide to Periodical Literature.*

SOUTH MOUNTAIN COMMUNITY COLLEGE

BOOKS IN PRINT: CD-ROM, citations, updated quarterly.
DATATIMES: Online, full text, updated every 24 hours.
DIALOG: Online, bibliographic citations and abstracts.
ERIC ON CD-ROM: Citations and abstracts.
NEWSBANK: CD-ROM citations, full text on microfiche.
OPAC: Online Public Access Catalog with magazine index and connection to ASU.
WILSONDISC: CD-ROM, citations, updated quarterly, *Readers Guide to Periodical Literature.*
WILSONLINE: Online access to all the Wilson Indexes. There is a fee for its use.

LOCATING OPAC THROUGH A-1

1. To find **OPAC** in **A-1** go to the following screen:

   ALL-IN-1 Professional Workstation

2. Locate the following option:

   LIB Library / media / software catalog

3. Type in **LIB** and **Press Return**; the following message will appear:

   Authorized users are Welcome to LIB,
   Library's Vax 6410

   Use CTRL/Z to exit from the online catalog

   Which College? (Press Return for listing)

   Please enter one of the following?
   PC,GC,GW,MC,SC,RS,SM,CG,PV,EM,DO, or
   ASU

4. Enter the college of your choice and **Press Return**.

5. If you want to access the **ASU** catalog from **OPAC**, type **INFO** at the prompt (>>) and Press **Return**.

6. To access from your desktop dial 231-9305 and at the **LOCAL** prompt, type **C LIB**, Press **Return**; **USERNAME** will appear, type **LIB**, Press **Return**.

Organization of a District Workshop on BITNET/Internet

Imagine being able to sit at a personal computer in your office and search to the online catalogue at any major university in the United States. This is the world of BITNET/Internet. The computer network was originally established, by the Department of Defense for the sharing of geographically distant computing resources and scientific data. From this beginning, BITNET and Internet have evolved into the two major international scholarly computer networks.

Internet provides global access to computing and informational resources over 1,000 regional, governmental and campus networks. The networks include many library OPAC's, local newsletters, regional databases, Hypercard stacks and public domain educational software.

BITNET (the Because It's Time NETwork) links over 500 colleges and universities with electronic mail and file transfers. Besides the electronic mail function, BITNET provides access to fileservers, electronic journals and group forums.

On April 5, the Ocotillo Library Users Group sponsored the first district workshop on BITNET/Internet. The workshop, aimed at faculty and librarians, gave basic information on what BITNETand Internet have to offer. It also provided workshop participants with an opportunity for hands-on experience with the networks. The demand for this workshop was much greater than anticipated. Over 190 people responded to the initial memo resulting in the addition of an extra workshop session. The trainers included Anne Lipow, a specialist in electronic instruction at U. C. Berkeley and KC Hundere, Director of Network Services at Glendale Community College.

Participant response has been very positive and interest as information networks continue to grow. The demand for this technology has resulted in the prioritizing of BITNET/Internet with the Information Technologies Service department. In the months ahead, there will be vast improvements in BITNET/Internet as they exist within the MCCCD, including the creation of documentation. The Library Users Group would like to thank KC Hundere for graciously agreeing to help with the workshops. Janet Whitaker and the ITS staff also deserve much credit for coordinating the technical components required to make this project a success.

Future Goals

This has been an exciting and productive first year for the Library Users Group. Although significant progress was made there are still many questions to be answered.

Completion of the Database Catalogue is just the first step in increasing faculty knowledge of library resources. Some faculty may be subject experts, but many are untrained end-users and do not have the skills required for searching and retrieving of information from the computer systems. What would be the best method to up grade faculty skills?

For information literacy to become a reality, faculty must make information technology a key component of their information gathering pattern. The use of information networks must be incorporated into the classroom learning environment. This integration will require: 1) on-going updates of the rapidly changing information technology, 2) ways to obtain faculty feedback on what they want and need in concerning discipline-specific databases and 3) practical suggestions and examples of ways to incorporate information technology into lessons plans. How can these be done?

Finally, how do we provide student access to the new information technology? Should electronic mail access be come a normal part of student life? What will be required for students to complete assignments using the new information technology?

This year the library Users Group made a commitment to providing useful information to faculty and establishing a link between the classroom and the library. In the future, it hopes to play a key role in making information literacy a reality.

NON-TRADITIONAL INSTRUCTIONAL ISSUES

By: Mary Alcon, MCC
Mike Rooney, DIST

CHARGE:

Continue the excellent work of last year, reviewing the document and presenting it to the groups who will be using it frequently.

Background

Our group decided to look at the specific recommendations made by last year's group and forward items to the proper parties to be placed into action and/or to start discussion that would bring or start to bring them to a conclusion.

Year in Review

At our first meeting on November 26, 1990, the group reviewed the recommendations listed in the Ocotillo 1989-90 Year-End Report (Open-Entry/Open-Exit [OE/OE] Discussion) and chose the following items to address.

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Definition

After a thorough search, it was discovered that the Governing Board had not adopted a definition of Open-Entry/Open-Exit courses. The following definition was recommended and approved by members of the group at a district-wide workshop:

> "Open-entry/Open-Exit courses are courses which may commence at any time during the fiscal year and are characterized by students entering and completing at a variety of times. These courses are competency-based."

This recommendation was forwarded to Dr. Alfredo G. de los Santos Jr., Vice-Chancellor of Educational Development on March 18, 1991 for his assistance in obtaining the Governing Board's adoption.

Record Management

*45th-Day Rosters

At a district-wide workshop, it was recommended to all A&R Directors not to print the 45th day roster for OE/OE courses. Most colleges are accommodating this request. However, the method to accomodate was not clear. This can be done through the "begin" and "end" dates assigned to these courses.

*In-Progess Grade

The committee approved and forwarded a memo to have the percent symbol (%) replaced by **IP** to indicate that the student is "in-progress" and has not completed his/her requirments within the time allowed in the contract. It is possible to have the change programmed according to ITS. The memorandum was forward to Dr. Alfredo G. de los Santos Jr, Vice-Chancellor for Educational Development with copies to Jack Twitchell, Chair of Common Pages, Mary Lou Bayless, Chair of the A&R District Committee and Jan Baltzer of ITS. It is recommended that the **IP**, appear in the common pages of the catalog as soon as it is implemented.

*Grade Rosters With End Dates

A recommendation to include end contract dates on final grade rosters was forwarded to the Chancellor of Educational Development and other appropriate parties on March 18, 1991. Since this will involve programming tasks, this item will take some time to finalize.

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*Common "Start" and "End" Dates For All Colleges

Since most campuses wish to remain autonomous, and days in which computer labs are available vary from college to college, this item was not regarded as an important issue. However, it is recommended that the start and end dates be consistent **within** the campus.

*Record Keeping

The project INFORM was piloted on two campuses this semester and will continue to be expanded to other campuses as resources become available at each campus. Consensus of the committee and those present at the workshop agree that INFORM will solve many record-keeping problems for OE/OE faculty.

It is recommended that District should continue its support for the development and enhancement of INFORM. It is also recommended that smaller colleges be provided with resources to implement INFORM.

*P/Z Grade

Although the P/Z grade was not discussed at the district-wide workshop, it should be noted that the catalog Common Pages clarify the "P" and "Z" grades. The catalog Common Pages explain that the grades "P" (credit, equivalent to a grade "C" or better) or "Z" (no credit) are not computed in the student's grade point average. Credits earned with a grade of "P" may be counted toward graduation. An advisory note has been added to explain that some institutions outside the Maricopa Community College District may translate the "Z" grade as "failing".

Human Resources

Residential Faculty Policy Manual (RFP) issues involving non-traditional instruction were forwarded to the Faculty Association Executive Council which included the following:

*Staffing OE/OE

Non-traditional instruction FTSE, specifically OE/OE FTSE, is not taken into consideration when hiring OE/OE faculty. As currently stated, RFP 5.2 for minimum residential instructional staff positions are based only on **day FTSE**, this allows very little leverage for hiring OE/OE and short term residential positions.

We recommend that RFP recognize OE/OE FTSE, short-term FTSE and/ or any non-traditional FTSE as a basis for justifying residential faculty positions.

*New Faculty Positions

Non-traditional instruction has caused the emergence of new roles and responsibilities for faculty that have not been defined, that have no guidelines for compensation and/or loading and that do not lend themselves to the existing faculty evaluation processes.

We recommend that the Vice-Chancellor of Human Resources, the Faculty Association Executive Council, and faculty representatives from Non-Traditional Instruction open and resolve RFP issues involving non-traditional instruction, including new faculty positions, loading and compensation, evaluation, and faculty/department/division status.

Items That Were Included In Last Year's Report And Not Discussed This Year

*Procedure

There is no District procedural guide for the establishment of OE/OE courses nor the process for starting an OE/OE course.

*Staff Positions

New OE/OE support positions have emerged that need to be included in the "Job Bank" which includes new job descriptions, new job titles and evaluation processes.

In addition to the new staff positions, we need legal guidelines to understand who must be present in OE/OE labs at all times.

*Enrollment Agreements

We need to discuss the legality of Enrollment Agreements (contracts) and the adoption of a district-wide standard agreement .

The following are copies of letters mailed to responsible agents.

Date: March 18, 1991

To: Dr. Alfredo G. de los Santos, Jr., Vice-Chancellor for Educational Development

From: Mary Alcon, Chair Ocotillo Non-Traditional Issues Committee

Re: Open-Entry, Open-Exit Definition

At our Open-Entry, Open-Exit Workshop held on Friday, February 15, 1991, the members present voted to have the following definition for Open-Entry, Open-Exit classes presented to the Governing Board :

> "Open-entry, open-exit courses are courses which may commence at any time during the academic year and are characterized by students entering and completing at a variety of times. These courses feature competency-based instruction."

We would appreciate your assistance in getting this definition for OE/OE adopted by our Governing Board.

We would also like to see the definition included in the common pages of campus catalogs.

A search was made of all Governing Board motions and nothing was found to indicate that a definition of Open-entry, open-exit classes had been adopted.

c: Jack Twitchell (common pages)
c: Mary Lou Bayless (District A&R committee)
c: Jan Baltzer (Gary Nusbaum)

Date: March 14, 1991

To: Dr. Alfredo G. de los Santos, Jr. Vice-Chancellor of Educational Development

From: Mary Alcon, Chair, Ocotillo Non-Traditional Issues

Re: In-progress grade for OE/OE Classes

At our Open-Entry, Open-Exit Workshop held on Friday, February 15, 1991, the members present voted that the grade "IP" be adopted as a valid grade for OE/OE classes. "IP" would be substituted on the students' grade reports instead of the current % symbol. This grade would signify that the student is "in progress" and has not completed his/her requirements within the time allowed on the contract. The committee felt "IP" would not be as confusing as a percent symbol (%).

I have checked with Jim Devere and it is possible to have IP programmed as an "in-progress" grade. He recommended that the change be submitted to the District Chair of Admissions & Records since that committee works with Gary Nusbaum.

We would also like to have the IP appear in the common pages of the catalog as soon as it is implemented.

c: Jack Twitchell (common pages)
c: Mary Lou Bayless (District A&R committee)
c: Jan Baltzer (Gary Nusbaum)

Date: March 18, 1991

To: Dr. Alfredo G. de los Santos, Jr., Vice-Chancellor for Educational Development

From: Mary Alcon, Chair Ocotillo Non-Traditional Issues Committee

Subject: End Dates on Grade Rosters for OE/OE classes

At our Open-Entry, Open-Exit Workshop held on Friday, February 15, 1991, the members present voted to include contract end dates on OE/OE grade rosters. This procedure would save the instructor a considerable amount of time when posting grades for several hundred students.

I would be happy to work with the proper channels on this item.

c: Mary Lou Bayless (District A&R committee)
c: Jan Baltzer (Gary Nusbaum)

Date: March 25, 1991

To: Betzy Hertzler, President-Elect, Faculty Executive Council

From: Mary Alcon, Chair, Ocotillo Non-Traditional Instructional Issues

Re: Non-Traditional Instructional RFP Issues

As Chair of the Ocotillo Non-Traditional Instructional Issues Committee, I am submitting to Faculty Executive Council RFP matters that should be considered and/or discussed as side-bar issues:

STAFFING OE/OE
Non-traditional instruction FTSE, specifically OE/OE FTSE, is not taken into consideration when hiring OE/OE faculty. Under RFP 5.2 for minimum residential instructional staff positions is based only on **day FTSE** which allows very little leverage for hiring OE/OE and short term residential positions.

We recommend that RFP recognize OE/OE FTSE, short-term FTSE and/or any non-traditional FTSE as a basis for justifying residential faculty positions.

NEW FACULTY POSITIONS
Non-traditional instruction has caused the emergence of new roles and responsibilities that have not been defined, that have no guidelines for compensation and/or loading and that do not lend themselves to the existing faculty evaluation processes.

We recommend that the Vice-Chancellor of Human Resources, the Faculty Executive Association, and faculty representatives from Non-Traditional Instruction open and resolve RFP issues involving non-traditional instruction, including new faculty roles, loading and compensation, evaluation, and faculty/department/division status.

Attached are copies of documents relating to this issue. If you have any questions, please feel free to call me at 461-7272.

SUPPORT FOR TECHNOLOGIES

By: Barbara Kilpatrick, MCC
Jamie Cavalier, DIST
Debbie Krumtinger, DIST

CHARGE:

Comprehensive plan to support: 1) instructional users of technology; and 2) administrative users of technology. This plan may include issues of training (both individual and group), technical assistance (hardware and software), and will address levels of support which can be provided from the district office. It will also include a description of the various college-based support models.

Background

The Support for Technologies Committee has met several times this past year. Support, training and development are key elements in the infusion of technologies for faculty and staff throughout the district. However, each college based on its own priorities and communities, has addressed its unique training and development needs. The committee recognizes college differences, yet also, identifies common elements in its proposed plan. The plan has been derived through lengthy discussion and much thought by members.

Year in Review

The plan for technological support for MCCCD will be divided into five areas: 1) Hardware Support; 2) Software Support; 3) Training and Instruction; 4) Vendors; and 5) Other.

It is apparent that the colleges vary widely in the type and scope of support in the above areas. Detailed reports from several colleges and District Training Services are included with this plan.

Ways that support can be enhanced using methods employed at some of the colleges or in business and industry will be suggested. What is successful at one college might not work at another.

It is often difficult to determine if a user problem is the result of software, hardware, or user error. A program, such as the Trouble Management System (TMS) at MCC, may help in these situations. TMS is a VAX based computer program which tracks and records user problems. (See MCC's report for details.)

Changes in technology occur so rapidly that it is becoming more difficult to support the various hardware and software used at the colleges. The committee recommends standardization in hardware and software as much as possible.

Hardware Support

The purchase of hardware should be coordinated through a centralized location, to insure that equipment is standardized and supports the software required. Committees composed of faculty, staff, and administrators should be set up to determine how the capital budget for computers and other technology is to be allocated. The limited funds available for equipment should not controlled by a single person or by a handful of individuals.

The installation and repair of equipment should be performed by resident college personnel in order to obtain the most efficient service. District repair personnel can be utilized as a supplement to the campus personnel if a backlog occurs.

Software Support

Software support services should evaluate, catalogue, update and maintain a library of master disks of application software used on microcomputers. These services can be performed at a centralized location, such as an Innovation Center.

Faculty should be able to receive assistance in preparing software for instructional use. A user hotline, such as the one at GCC, should be made available to enable faculty and staff to receive assistance from highly knowledgeable individuals in software applications. This hotline should be staffed even during lunch hours.

The use of a standard software configuration such as the one that MCC has installed on computers used by faculty and staff could be implemented on other colleges to aid in the support process.

Eventually, it would be valuable to have all software in the district cataloged on the VAX system. Employees could access this information and evaluate software before purchasing.

Quantity pricing should be obtained on software. The district purchasing department should distribute a list of recommended vendors and prices available on software. This list should be updated monthly on A1 and/or hard copy. If better pricing is available, this information should be given to the district purchasing office, who could then revise the list.

Training/Instruction

The District Training Services provides training and support to all employees at the district offices and the colleges. This involves information technologies of computers, telecommunications, and related human resources development topics such as telephone techniques, improved communications, etc. Both standard and customized workshops are offered. Consulting, hotline "help", and coordination with the colleges by supporting the Regional Training Facilities are integral parts of the service.

A one-year pilot project at GCC which established a Regional Training Facility has been extremely successful. Similar facilities at other colleges appear to be understaffed.

A National Bureau of Standards report found that the majority of institutions had an average of one trainer to 50-125 computers. This number at our colleges could be reached by hiring additional full-time staff and obtaining the services of full and part-time faculty.

Audio tapes, data disks, and training manuals such as those developed at MCC, would be helpful for reviewing software applications.

Follow-up training in individual and group settings that allows faculty and staff to learn advanced features of software should be offered throughout the year.

An incentive for MATP and PSA personnel to receive training should be established. This could involve credit on a salary schedule like faculty, or a non-monetary reward such as time off work.

Vendors

Demonstrations by vendors and product manufacturers provide information about to learn the latest technological advancements. These should be coordinated by the Innovation Center or similar department and meet the following standards: (1) They should be informational and not sales oriented; (2) products must be appropriate for instructional or administrative use; and (3) the demonstration should be open to all faculty and staff.

Authoring Center

GCC has an Faculty Authoring Center for the writing and development of instructional materials for applications software and authoring languages to develop materials in all disciplines.

Conclusion

We can all benefit by pooling information about what is being accomplished in technological support at the district and the colleges. This sharing should continue.

Addressing Specific College Support Needs

Mesa Community College

Introduction

As a department under Information Services, the Center for Instructional Innovation is charged primarily with providing faculty, staff, and administration at Mesa Community College with an opportunity to examine, to a large part, the Center focuses on teaching technology and bringing individuals closer to new and/or useful tools that enhance and assist them in their job responsibilities.

Recognizing the need to keep abreast of current informational and technological developments, Mesa Community College has demonstrated commitment to providing students, faculty, departments, and staff with access to computer facilities. Changes in technology occur at a dizzying rate and obsolescence is the rule rather than the exception. Consequently, it is often difficult to select appropriate hardware and software which will meet current administrative, as well as academic needs, and also last for an extended period of time.

The focus of both Information Services and the Center for Innovation has been on the development of mechanisms to continuously assess the need and importance of various forms of information technology. There are four components which should be addressed when providing computer access. The four components encompass hardware, software, training/service, and support. Each of these components have required standards be set as the campus computing environment has evolved. Each of these components has also required a commitment of funds and personnel dedicated to the task at hand.

Objectives

The Objectives of the Center for Instructional Innovation are to:

- Provide faculty, departments, and staff with technical facilities which meet their needs

We have a training classroom and a working room that is dedicated to just this function. The training room holds 12 MAC SE/30 computers with the instructional station being a MAC IIci. We currently access the Business Department's Instructional classrooms for IBM training.

The work room is where we house "state of the art" technology for the campus community to review and utilize. Some of the equipment in the working room for the MAC includes a full-page monitor, a color monitor, a color printer, and a color scanner. For the IBM, there's a Super VGA monitor.

- Provide opportunities to campus personnel who have innovative ideas

We have scheduled demonstrations of faculty using technology and vendors wishing to address the campus community. The focus has been here to encourage participation of the campus community in demonstrating their use of technology.

- Gather and disseminate new and useful information

Development of a software library falls under this category of accomplishments. The cataloging process is currently in its final phases that will establish continuity and better control the way we deal with managing software on this campus. Not only does this bring us in touch with the Library cataloging system, but also allows us to better track our resources and address related issues, such as--- who has them, how they are being used, and how many copies we have to upgrade when new releases are offered.

In addition to the software library, we have established a reference library on the supported software list for MCC. The platforms for reference not only include books, but video and audio tapes that deal with assisting users toward learning supported software packages through a self-directed style of delivery that closely parallels our training classes.

- Encourage campus-wide technological literacy

Providing a comprehensive orientation and training program has been one of the ways computer literacy on this campus has increased. Orientation of personnel to the campus computing platforms, plus following this up with an aggressive training program offering to increase literacy has been the primary focus of the Center for Instructional Innovation this past year. Delivering 95 computers in 1989-90 and 55 in 1990-91 academic years has meant an audience that has been presented an opportunity to enrich their efficiency. The coming years will be concentrated on facilitating interests in computer literacy and beyond as well as orienting newly hired employees. This campus is currently now in the "Age of Discovery."

- Coordinate activities with other organizations to optimize existing training and support efforts.

Meetings with the Library, Media Services, Information Services, Departments on campus, and key administrators has made us able to create a relevant, current, and effective offering of diverse training courses. Of the culmination of these meetings has come training from campus personnel who not only teach, but also support the systems they teach in their day-to-day assignments. Representative of these types of training classes is SIS by Carol Peterson, SAM by Sandy McLaws, FRS by Ron Etter, and Library Orientations by Florence Landon.

Along with coordinating activities, let us not forget that this is Mesa's first year "linking up" to the District Training Services team. Resources in this area have certainly increased our ability to do more with less, plus availed the campus community to the courses without having to travel to the District. The benefits of their years of experience in this element, and distributing this out to the campus sites has made a big difference in our program.

Policies and Procedures

Standards ensure stability and fairness in accessing resources. The resources provided to faculty through the Center for Instructional Innovation encompass hardware, software, service, and support. The following depicts those four areas and standards established to maintain each:

Hardware

Three platforms are currently being offered and supported in this category. IBM, DEC, and Apple. Standard workstations are either MAC SE 30 models or IBM 386sx. Terminals for the DEC environment are Wyse.

All machines are networked to the VAX using PCSA software manufactured by DEC. All workstations have print zones that reach not only to our campus, but other campus locations within the district as well. Through the technology of networking, the campus community now has windows to worlds of information sitting right on their desk. . . it is our most recent challenge to acquaint the users with this ability.

The priorities for equipment requested by faculty was first established through a survey put out by the ITAC (Information Technology Advisory Council) in December of 1989. After reviewing the results of the survey, priorities were established and computers began to be ordered and installed, and faculty trained. The training of 6 clock hours was required before any computer could be "officially" given to grant requests. Of the 6 hours, 2 were to be spent on Orientation, 2 hours spent on Productivity software, and 2 hours spent on Systems (A1). With this mandate, the thinking was to provide a win-win situation where we not only delivered the tool, but knowledge of how to not only operate the tool. . . but to foster innovative thinking too.

Software

As we have developed the standard workstation, so have we come to an agreement as to what our resources will service, known as supported software. The software on the supported software listing means that certain packages receive "comprehensive" support. Beginning January 14th of this year, the following software packages have been "comprehensively" supported by Training and Information Services Technicians:

VAX:	All-in-one (A1)		Electronic Mail.
IBM:	MS-DOS	3.3	Operating System
	Set Host		Terminal Emulation
	Microsoft Works	2.0	Productivity Software
	WordPerfect	4.2	Word Processing
	WordPerfect	5.1	Word Processing
	Lotus 1-2-3	2.1	Spreadsheet
	Close-Up LAN		Remote System Operation/ File Exchange
MAC:	MAC System	6.0x	Operating System
	VersaTerm	4.0	Terminal Emulation
	Telnet		Terminal Emulation
	Microsoft Works	2.0	Productivity Software
	Microsoft Word	4.0	Word Processing
	Hypercard	1.2.x	Instructional Developmental
	Excel	2.2	Spreadsheet
	Pagemaker	3.0	Desktop Publishing
	Pagemaker	4.0	Desktop Publishing
	Timbuktu	4.0	Remote System Operation

The standard workstation (IBM or MAC) includes one of the following: a Terminal Emulation Packages, Operating System, Remote System Operation package, and Microsoft Works. All of the packages noted above are "comprehensively" supported. Policy has also been set to add and remove software from the supported listing.

Of the packages not supported on the list, Computer Services personnel will aide in converting existing data files to the supported packages.

Of the systems not listed, yet offered in the training program, support is found in the various departments on campus. For example, SIS is supported by Admissions and Records, FRS by the Fiscal Office, and SAM through the Dean of Instruction's area.

Various student computer labs support the software used in those labs, which is another resource personnel have to utilize for assistance.

Service

To have computer equipment repaired on the Mesa campus, a phone number has been established for this purpose. In addition to calling in repairs, a computerized system is established for logging in service calls TMS (Trouble Management System). This software package allows anyone on campus to log in a call by typing in TMS at the $ prompt. It is then input in the database of job orders that are then routed and handled by the appropriate technician. In addition to this feature, TMS allows the Information Services area to better manage and project growth patterns based upon statistical data the service calls generated. TMS will not only avail the logging and tracking of the call, it maintains a database based upon the input. All calls are logged into TMS for this reason.

Support

Listed above, under service, is how people also receive hardware support. Software is supported by training classes (either MCC or District personnel), media, and individualized instruction. Answers to questions relating to the supported software may also be obtained from accessing the Information Services main phone number.

With the support issue in mind, an experiment was conducted whereby audio tapes were utilized as a base for training. The premise was that with computers, if you don't use the knowledge, you soon lose it. With the audio tapes and a data disk, training manuals were developed. The support for the program was that if a person attended a training session, they could take the materials (disk and manual), check out the audio tape and data disk, and repeat the class when they needed refreshed on the material. This program was put into place this year for the MAC Works series only. It has been most helpful in allowing our audience to experience retention and flexibility in their learning styles.

Video tapes as well as resource books are also part of the support offered for training personnel on computers and software.

As far as personnel, this is our weakest area. The Center itself is housed in the Library and is open the hours of the Library. However, personnel available is on a limited basis as the Center only has one full-time Instructional Technician plus a part-time student worker and two reassigned faculty members. Other assistance on support of hardware and software is gained from Information Services. Training, development of courses, answering questions, booking classes, managing the Center, interfacing with campus committees, etc. ... all is done by these few folks.

Vendors

Vendors of software and hardware may be invited to demonstrate their "wares" if: a) faculty members request a demonstration and it is pertinent to the mission of MCCCD; b) the vendor currently contracts with MCCCD; and/or c) the vendor has a unique or new and interesting product. Demonstrations need to be available for all! The demonstrations must be informational and NOT sales-pitch oriented. Products brought in for demonstration are encouraged to be of instructional value. However, the Center has coordinated efforts for products that are of administrative value too. The Director of Information Services plus the Dean of Administrative Services approve all demonstrations on campus. Other Deans may be required depending upon the subject area demonstrated.

Recommendations

Based upon past experience in pioneering and now facilitating the campus training effort, we submit the following we feel would be wonderful additions to a vital campus entity:

- ANY personnel on campus have access to training.
- Demonstrations by vendors be informative, related to instruction, and NOT be closed sessions. These activities should be made available for all interested parties.
- Professional Growth credits be established or college credit offerings for those who participate in training classes. Some form of compensation needs to be identified for people as an incentive to participate in the in-service programs.
- Standardizing the software supported. Those in the job of software support should not limit themselves from assisting any campus employee on a package they wish to have assistance. However, setting a standard in this area states two things. First, that we are qualified to answer ANY question you have on these packages. Second, we will not only assist, but offer training classes to match these packages. We have standardized due to people assuming expertise in areas where none existed.

  Realizing the differences in computing environments at each campus, we in no way wish to make the statement that all campus locations within the District support the same packages as we do. For obvious reasons, flexibility in the supported software will vary by the audience and amount of people dedicated to that effort at each campus.

- District training manuals should be distributed through the Campus bookstores. The costs incurred in reproduction is well worth it.

- Centralized purchasing should be established for software. Such benefits include volume purchase agreements, establishing a main source for the "best deal" on a given package, software reviews, etc.

- The tracking of licensed software is an absolute MUST! Putting in an inventory tracking system in this area is critical for upgrades and simply knowing where copies are located.

- A Centralized Inventory System for computer hardware tracking is also vital! Tagging equipment and making sure the procedure for removing equipment from offices is well stated will help here. Keeping a good handle on the hardware is a key to knowing where our resources are located and can easily generate information on product model and type when needed.

- New trainers should be involved in the District Train-the-Trainer program. Campus Trainers should be afforded the ability to attend seminars and trade shows whenever possible to keep pace with the demands of their areas of responsibility.

- The training schedule should be developed on a 6-week basis, one week off, and then 6-weeks again for each semester. This mirrors the District's policy on establishing and maintaining course offerings.

- Campus training classes should be advertised on a biweekly basis across A1 as well as site-based employee bulletins.

Scottsdale Community College

At SCC, Emma Walters is the Computer Trainer. She answers any questions relating to how something works or how to do something with a certain package. She does this by phone or by making office visits. She conducts formal (scheduled) workshops as well as provides one-on-one or small group training as needed for computer software and telephones. She writes materials when there are none already written.

Although Emma is responsible for training center upkeep, she has some support in training. Sandra Wells, the English lab technician, does demos for English instructors and students on the use of Electronic Journals, WordPerfect, and Finelines (the English software). Don Snow has conducted workshops on Electronic Journals.

In addition, I have been able to use Carolee Nemechek from A&R as a co-trainer for SAM. She will also assist me in SIS training and development of materials as I do not know SIS at this time. Nancy Coryell, Fiscal Agent, has volunteered to do an FRS workshop at the suggestion of someone at Mesa.

For the Fall, SCC is hiring a Director of Instructional Technology. This person should be an asset in training and enable us to expand technology support.

Hardware

Jerry Latham, Coordinator of Computer Services, is the main hardware support person. Occasionally, the computer lab techs may make a service call but their responsibility is running the computer lab. Jerry has asked for a new person, a hardware technician, so that Jerry can assume full-time his management responsibilities. However, we do not know when or if we will get this technician. The Audio Visual department supports equipment other than computers.

Software

Basically, Emma is the only software support person on campus. Users may ask co-workers about a solution and occasionally ask Jerry Latham. English faculty often consult Sandra Wells, although there are still many problems that Emma is called upon to answer.

The following are software that Emma supports:

IBM

Wordperfect
DOS
Lotus
dBase
ProComm
Food Trak
PageMaker

Macintosh

MS Word
MS Works
Mac Concepts
Excel
Pacer

PageMaker
MacWrite
MacDraw
MacPaint
SuperPaint

VAX

A1
Electronic Journals
SAM

Phone

Communication Skills
Dterm 5 skills
Voice Mail

Software Emma is being asked to support and train:

Windows

Micrograde
FileMaker

SIS
Job Placement
NLI

Emma is also asked to look at whatever package someone gets in when I can arrange it around my schedule.

Vendors

There is no set procedure for having vendors demo at SCC. In the past, we have had a technology expo in February but did not this year. An individual may set up a demo of a product. For example, Bud Sessions has set up a series of three demos on Music Synthesizing. Rita Richards has arranged for a demo on INFORM recently. Announcements of these demos are usually sent out on A1 to everyone.

Rio Salado Community College

Most of you have heard the term RioNet developed by Edward Kelty, Coordinator of Computer Services. Have you ever wondered what RioNet stands for and how it might affect you? RioNet is more a philosophy of how our computer systems should serve us and not some black box locked in a closet somewhere. The whole idea behind RioNet is 'Ease of Use' and 'Integration'.

The first step towards this goal was to make sure as many people as possible had access to our computer systems. With the installation of our computer network at Rio North, East, West, and Main, we expanded the number of computers that could access our systems from 95 to over 225!

The second step was to make a menuing system on our VAX that was very easy to use. The On-Line Retrieval System (ORS) was created to allow people to access information without having to know where it was stored or how to run complicated programs.

The third step, which is where we are now, is to make a standard menu for all of the PCs (personal computers) that Rio's employees use. This new menu has all of the programs on it that everyone is used to, plus some extra features. The two most noticeable features are the printer selection and personal drive. When people are added to RioNet, they can print to any laser printer located at our college even if it's at an area office.

The personal drive is a "mini" hard disk that everyone is assigned (even though they may not know it yet!) where they can save their PC data. Since the personal drive is linked to the person's on A-1 account it has the same protections, meaning no one but that person has access. The other nice feature is it can be used from any PC on the network. A PC at Rio East will look and function the same as one at Rio Main.

The last step will be an on-going process of integrating (as much as possible) old and new administrative systems like SIS and INFORM into the RioNet philosophy.

Gateway Community College

Nancy Musser at the Computer Institute at GWCC states that the Institute handles the software and hardware support for faculty and staff. They have standardized software and hardware in the sense that all faculty have Macintoshes. Faculty can check-out software from the Institute. The Institute staff and lab techs will troubleshoot, but there is no formal training either in groups or one-on-one. The Institute discourages the use of any personal software especially on any GWCC machine that is networked or has a hard drive due to the threat of viruses.

If a faculty member has a problem that the Institute cannot solve, they send them over to MCLI at the district. Very few staff come to the Institute for help. The majority of staff have their workstations which may contain IBM, MAC, Wyse, or other machines. The Institute will not allow any personal use any of their machines due to the drain on resources such as paper, use of machine, etc. by either faculty or students.

Chandler-Gilbert Community College Center

To help respond to the increasing demands associated with providing campus support for technology, Chandler Gilbert College has looked at several options to help develop strategies for supporting academic and administrative users. In cooperation with District Training, Staff Development, and the Computer Information Center we have a series of training sessions scheduled each semester for small group activities. In addition to the group training, we have audio and video tape materials for those who prefer self paced learning, and also offer limited training on an appointment basis for individual assistance.

Standards for software and hardware platforms is a very important key to structuring any support plan. Outside of the classroom, we are predominantly a Macintosh shop with approximately 100 installed units with the base unit a Macplus. As for DOS workstations, we have less than 10 units installed with the base unit an AT 286 workstation. Software support is presently limited to the following list.

Macintosh -	MSWorks 1.1, 2.0, Superpaint 1.1, Red Ryder HyperCard, MacTerminal 3.0,
DOS -	WordPerfect 4.2, ProComm,

Technical Support associated with trouble calls for hardware and software is coordinated through a locally developed system called "Work Order Processing". This system is a collection of Hypercard stacks that includes options for generating requests for:

Computer Equipment Maintenance
Telephone Repairs
Supplies (Computer related, ribbons, toner, paper, disks)
Software Support

The concept is somewhat similar to MCC's Trouble Mgt System, in that requests for the above services are electronically generated to a common location on campus, thereby helping Student Technicians to schedule and allocate their time more efficiently and improve the level of service to the users. The difference in our service structure is that departmental office coordinators are the key individuals who are setup to generate these requests for their respective areas. This helps focus calls through a local departmental person and provide a consistent contact for follow up.

Phoenix College

Phoenix College (PCC) is an intensely active member of the technological environment within MCCCD; technology is threaded throughout our campus. In our on-going commitment to "continue to develop as a comprehensive community college which is responsive to the changing needs of the community," we must accept the custodianship of teaching excellence, intellectual growth and technological innovation. Through technology, we have the opportunity to offer students a new relationship between themselves and the world in which they live.

We are excited about the technological resources available on our campus; the Electronic Teaching Library, the Library Skills courses, the computer lab located in the Library, faculty and student involvement in the Electronic Forum, and the list goes on. As we continue to expand our technology, we are planning for increased participation of faculty and staff to assist in the technological/instructional infusion.

Hardware

*Computer Services is responsible for the installation of micro/computer/computer terminals for the VAX mainframe; connections and network installations between micro/computers and the VAX; telephones and telephone lines and cables; the set-up and installation of hard disks and participation in University Purchase Program for the college employees and students.

*Data processing is also a function of Computer Services. Jobs are scheduled, submitted, executed and printed every night so that requested reports can be delivered on a daily basis.

*TIME-SHARED, INTERACTIVE, COMPUTER-CONTROLLED, INFORMATION, TELEVISION (TICCIT) has two (2) support personnel. Training is available for instructors wanting to learn about the TICCIT/MICROTICCIT system of instruction. Currently the most utilized courseware on the TICCIT system of instruction are Math, English, Chemistry and Physics. Spanish and French are also available on the MICROTICCIT System. Each class has an instructor even though the material is presented to the student by the computer. The TICCIT management team will assist both students and instructors on the use of the TICCIT programs and the TICCIT course development. In addition, the ITCCIT Lab is staffed with student proctors to assist students in the operation of the computer. Weekly printouts are provided to the instructor indicating individual student performance levels and statistics. TICCIT can also be used as a supplement for a number of courses.

*Business Personal Computer Labs personnel support the open entry labs by troubleshooting technical problems in traditionally taught classes and Office Automation Systems (OAS) open entry.

Software

Software support is provided in two (2) ways. Training in commercial packages (such as, Word Perfect, etc.) is attained through self-study, District Training Services, and/or professional seminars. Skill development software (such as, keyboarding, skill building, etc.) is self taught and/or vendor provided. This latter software category is usually tied to specific textbook publishers. Some of the publisher have a software support phone number.

Training/Instruction

Training is supported throughout the Center for Teaching and Learning (CTL) by presentations of All-in-One Electronic Mail (A-1); telephone training; Voice Mail Messaging; Student Information System (SIS) and Financial Records System (FRS).

Integrating library skills into English 102 is and component for our campus. As the library increases access to information resources, librarians and English faculty are exploring how best to help students learn the skills required to find information needed to complete assignments. This semester, a librarian is team teaching with an English 102 instructor. By planning assignments together and including timely instruction to electronic database searching, students are systematically learning to fine resources more effectively.

- The librarian and English 102 instructor meet regularly to discuss students' assignments and instructional needs.

- The librarian develops the instructional materials and teaches skills required for students to find information in the electronic databases.

- The English 102 instructor sets the parameters for the assignments, teaches students how to plan, organize, and complete a research paper.

Electronic Forum (EF) is a computer bases system which allows students and faculty to interact anonymously. Discussions can be carried out beyond the bounds of the class period. One of the educational benefits of the EF is that it encourages students to write. The assumption is that the more they write, the better they write.

There was a public forum on the Persian Gulf war, forums for all students in the honors and classics programs as well as class forums in the disciplines of Math, Chemistry, Humanities, Economics, Communications, English and Biology with over 1000 Phoenix College students and faculty involved.

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Project synergy is PCC faculty working with IBM and Miami-Dade Community College faculty in an extensive software evaluation project. The project is searching for software for basic skills development which can be placed into an integrated learning environment.

Satellite feed provides access to the latest news from around the world. CTL has subscribed to X-PRESS, a service which carries 12 international news agency stories. The news agencies include the countries of Russia (TASS), Japan, France, Mexico, Germany, China, Canada, and others.

Currently we are working with the technical aspects of getting this information from the satellite dish to the Library. It will soon be available, and then faculty will be educated to use it in their classes.

Library computer lab is providing easy access for students with information literacy as the primary focus. Instead of going to the library and taking notes on paper, they they may now take notes on a computer and begin a research paper concurrently. Working with students in English and Classics, librarians are teaching students skills needed to access information in the electronic era.

The library lab ties together information sources, writing skills, research skills, and computer skills. It also allows for students to experience and use multimedia (text, sound, graphics, and full motion video) as a new source of reference material. Imagine the difference between reading Martin Luther King, Jr.'s *I Have A Dream* speech, and seeing him deliver the speech in front of the Lincoln Memorial with thousands of persons in the audience. Multimedia reference material makes the content come to life.

Electronic kiosks is another avenue to providing ready access to campus events and activities to our students and the Phoenix Metropolitan community. Working with Student Developmental Services, the Advisement Center, Security, Career and Information Center, students and architects, the CTL is designing information kiosks to be placed at strategic locations around the college. Information contained on this electronic interactive kiosk may include:

- college maps
- room locators
- faculty and staff office locators
- class locators
- events calendars
- announcements

Project Jefferson is PC faculty developing a unique computer-assisted instruction program using the Project Jefferson software developed at University of Southern California (USC). This technology application emphasizes critical thinking, writing as a process, and the use of library resources.

- Faculty participate in workshops with colleagues from MCC, GCC, CGCC, and EMCC. These workshops are conducted by USC faculty and staff.
- The PCC team is developing a Project Jefferson program that integrates the current controversy on the *right to die* with literature, philosophy, and ethics.

The English faculty participating plan to implement the program in the Fall of 1991.

The support staff of librarians and technologists will assist with developing bibliographies, indexing of terms, developing of definitions of key concepts, programming, and an evaluation of the students outcomes.

Vendors

Vendors communicate with the Coordinator, Computer Services, and faculty members responsible for instruction in the computer labs. Demonstrations are arranged through these means.

District Training Services

The Training Services Office provides training and support to all MCCCD employees in the information technologies of computers, telecommunications, and related human resources development topics, such as telephone techniques, improved communication, etc. Training and support include both standard and customized workshops offered at the District Office and at the colleges, consulting, hot line "help" services, and continued coordination of efforts with the colleges by supporting the Regional Training Facilities.

Software

Training Services supports the software packages for which classes have been developed as well as several communication packages used for VAX connection. This support is in the form of training manuals, newsletters, consulting, phone "help" lines, and A-1 "help" accounts. A team effort has been established with the Regional Training Facilities in determining which software packages to develop for training classes.

Training/Instruction

Training Services provides a variety of classes on A-1, Macintosh, IBM, and the MCCCD phone system including use of the phone and Voice Mail as well as telephone techniques. This training is available in the Technology Training Center at the District Office, at college locations, through the use of a phone training video, and in some cases teletraining is provided over the RIO bridge. The standard training classes are offered for college credit. In addition, customized workshops are offered.

STANDARDS

By: Manny Griego, GCC
Don Shehi, DIST

CHARGE:

Continue the excellent work of last year, reviewing the document and presenting it to the groups who will be using it frequently.

Summary

Sections of the TECHNOLOGY STANDARDS AND GUIDELINES FOR THE MARICOPA COMMUNITY COLLEGE DISTRICT document were assigned to committee members for review and update. Document Revision 1 (draft copy) incorporates those changes submitted by committee members, along with a new guideline on LANs (Guideline H: PhoneNET LANs). When further revised, as noted below, Document Revision 1 should not be considered to be complete since it will continue to evolve.

The following are Standards/Guidelines which remain to be completed.

- Standard Symbols for Voice, Data, Video
- 802.3 Twisted-Pair Ethernet Cabling
- T1/DS1 Microwave Network

Additionally, the committee is still working on implementing a method which employs an electronic medium through which the document can be updated and disseminated.

Approximately 50 draft copies of Revision 1 were distributed to prospective users for review. Reviewers included Telecommunications Coordinators, Computer Coordinators, Media Directors, Legal Department, faculty, and administrators. Since only minor changes were recommended from a small response, the finalized Revision 1 was not printed for dissemination, but is included in draft form as follows.

Don Shehi and Manny Griego would like to thank the Standards Committee members for their help and cooperation: Ken Baer, Jan Baltzer, Jerry Baxter, Diane Bondurant, Lionel Diaz, Bob Huddleston, KC Hundere, Jim Jacob, Sam Matar, and David Waters.

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INTRODUCTION

This document identifies technology standards and general guidelines which are to be observed in the remodeling and new construction design of information technologies facilities for the Maricopa Community College District (MCCD). The prime purpose of this document is to cite the areas for which standards have been developed, and to direct the reader to appropriate reference material for detailed information. Wherever standards do not exist, this document recommends guidelines which have proven to be successful in District construction/remodeling projects. Standards and guidelines described in this document are not intended to supersede any state or local laws or codes.

The following information is included in Appendices.

[] Appendix A: Wiring for buildings
[] Appendix B: Pin outs for data adapters, punch block, and terminal servers.
[] Appendix C: Glossary of terms.
[] Appendix D: Specification checklist
[] Appendix E: Ocotillo Standards Committee Members (1990 - 1991)

Because of the inherent nature of changing technologies, this document cannot be considered to be complete. What are presently considered to be standards will continue to evolve due to changing technologies. Areas where experimentation has been the mode for planning and application will eventually evolve into standard operations to be followed by ensuing construction projects. Once standard, those areas will also continue to evolve.

It should be noted that any changes, additions, and/or deletions to the computer/telecommunications systems in the District must be reported to District Network Support through Jan Baltzer.

DISCLAIMER

Vendors are referenced in this document only to provide the reader with potential sources for information on specific devices and/or systems. No recommendations, explicitly or implicitly, are suggested. Prospective vendors who wish to be added to MCCD vendor lists, should contact the Director of Computing and Communications at the Maricopa Community College District Office.

STANDARDS AND RECOMMENDED GUIDELINES

The following areas are considered to be standards, and therefore should be adhered to in project planning and development.

[] Documentation and Labeling
[] Baseband/Ethernet Cabling

- [] Twisted Pair for Duplex Voice/Data Jacks
- [] Distribution System Requirements
- [] Pin-outs/Connectors/Termination Devices
- [] Coaxial-based Broadband

The following areas are recommended as guidelines to assist in project planning and development.

- [] T1/DS1 Microwave Network
- [] Relationship of Voice/Data/Video Communications to Electrical Environment
- [] Security Systems
- [] Entrance Facilities
- [] Outside Plant Conduits
- [] Conduits Within Buildings
- [] Engineering/Environmental Considerations

VOICE/DATA/VIDEO CABLING POLICY STATEMENT

Objective

Prior to the divestiture of AT&T and implementation of the District-wide Telecommunications Improvement Project, requirements for telephone cabling were accumulated by the individual colleges until sufficient quantities existed to request service from either Mountain Bell or AT&T. Requests for data wiring were made directly to Computer Repair Services and installations were completed as resources became available. Installation of data cabling throughout the District has required as many as three full time employees at one time.

MCCD now has total responsibility for voice, data, and video cabling. This includes responsibility for physically placing the cable and for maintaining both hard copy records, in the case of video cabling, and cable plant records for voice/data cabling cross connects. With this responsibility comes an opportunity to establish guidelines which will insure that future voice/data/video network expansion and cable plant integrity can be maintained.

In order to implement such guidelines, it is necessary for the Colleges and the District Office to jointly share responsibility for planning, implementing, and funding future additions and changes to the cable plant. Without guidelines, and adherence to them, it will be only a matter of months before the current cable plant installations begin to look like the old cabling network that had been previously replaced. A return to undocumented or poorly installed cable plant would result in significant additional expense when network expansion is deemed necessary.

Policy Statement
To improve the decision making process involving additions and changes to the voice/data/video cable plant, it is necessary to decentralize needs analyses. This procedure allows each college or department to determine the pro's and con's between their "must have" and "want to have" cabling requirements. The college will also be able to determine if it has technical staff to perform the addition or change, and to maintain cable plant records. In the event that a college does not have qualified staff, it may choose to contract out the work with MCCD approved vendors. An MCCD approved vendors' list may be obtained by contacting the MCCD Purchasing Office at telephone number (602) 392-2332.

If a college chooses to perform its own installation, it will be responsible for maintaining the wiring standards and installation quality cited in this document. The college will also be responsible for updating the hardcopy cable plant records and jack maps as well as the cable plant records.

Cable plant installations and documentation will be audited by the District Telecommunications Office on a regular basis. If, in the course of these audits, or in the course of daily operations, it is determined by District Telecommunications or Computer Repair Services personnel that any of the college installed cabling does not meet the approved standards or that cable plant documentation has not been adequately maintained, the District Telecommunications Office will be allowed to contact an approved outside vendor, have the non-standard area brought into compliance and back bill the appropriate college for the charges.

It is strongly recommended that the District Telecommunications Office and District Computer Repair Services be included in any planning for voice/data/video service additions/moves or changes that would effect entire departments or large employee work groups.

STANDARDS SECTION

STANDARD A: DOCUMENTATION AND LABELING

Documentation will consist of Cable Records, Test Records and Record Drawings prepared by the Vendor and submitted in original form on vellum or other reproducible media for advance acceptance by MCCD.

CABLE RECORDS

The vendor shall prepare and submit complete and accurate cable records showing every splice and cross-connect by cable, pair and terminal number. The cable numbering system will be consistent with that already established by MCCD.

TEST RECORDS

Every pair in every cable must be tested on an end-top-end basis after splicing and terminating. Defective pairs will be clearly identified as defective at both ends of the cable. Test record forms must be submitted to MCCD upon completion of tests. Maximum allowable defective pairs will be limited to 1% of the total number of pairs and a maximum of two (2) pairs per 25-pair binder group.

STANDARD SYMBOLS FOR VOICE, DATA, VIDEO

***** To be completed *****

RECORD DRAWINGS

Site drawings will be supplied on reproducible material. These drawings will include the following:

1. Distribution cabling system
2. Exact route of total outside plant including trenching and tunnel routes
3. Depth of cable trench
4. Locator coordinate measurements from cable location to nearest building.
5. Cable pair count, wire gauge and cable lengths of every cable included in the system.
6. Conduit fill ratio

FLOOR PLAN DRAWINGS

Floor plan drawings will include as a minimum:

1. Entry and IDF terminal locations
2. Riser drawings showing corrected terminal location numbers' and conduit sizes.

NAMEPLATES AND TAGS

It is MCCD's practice to place some form of identification on each cable and piece of equipment, conduit and terminal enclosure. Vendor shall provide and install MCCD approved marking tags to meet this requirement. Polyethylene tags secured by nylon cable ties will be used for all locations. Lettering shall be reflective black on yellow background for all markings. Tags on terminal locations shall show the cable sheath identification.

Identification markings shall be made at the following types of locations:

[] All cross connect terminal boxes.
[] Cables in the underground on both in and out sides for cables that are spliced within the manhole or pullbox/handhold.
[] Exposed conduits, near each end and approximately every 100 feet.
[] Cables at the entry point into a building, both inside and outside.
[] Splice cases for line splices, diminish/taper splices, terminal box splices and secondary cable stub splices.
[] Marking specifications apply equally to twisted pair, fiber optic and broadband systems.

STANDARD B: BASEBAND/ETHERNET

The different ways of physically connecting devices with each other on a network are commonly referred to as topologies. For example, the common-bus topology is one of several available topologies. Physical connection in this type of system is usually, but not always, a coaxial cable by which any number of devices can be tapped into.

Ethernet is a network which is implemented in a common-bus topology, typically with a 50-ohm coax cable. Data are transmitted directly as digital signals at a rate of 10M bits per second. With this type signal, only one device can transmit at a time. This form of data transmission is referred to as baseband.

Baseband standards for Ethernet are derived from Digital Equipment Corporation (DEC) Ethernet standards. Other documentation, such as network configuration maps, may be obtained from the MCCD Net Support system. Additional Ethernet specification details can be obtained from the following sources.

[] MCCD Systems Manager at Information Technologies Services (ITS)
[] Account Executive at Digital Equipment Corporation (DEC)
[] Network and Communications Buyer's Guide, DEC

THICK WIRE CABLING

The following standards should be observed when planning for standard (thick wire) Baseband/Ethernet cabling:

[] A single cable segment can be up to 500 meters (1640 ft.)
[] Multiple cable segments can be linked together with barrel connectors. A maximum of 100 transceivers (H4000) can be used on standard Ethernet cable segments. A repeater or bridge connects segments of Ethernet coaxial cable, creating larger local area networks (LANs).

THINWIRE BASEBAND/ETHERNET CABLING

ThinWire Ethernet cabling runs using BNC connectors can be up to 185 meters (600 ft.) and are connected to thick wire segments via a DEMPR or DESTA.

802.3 TWISTED-PAIR ETHERNET CABLING

***** TO BE COMPLETED *****

CONNECTION OF OTHER LANS TO ETHERNET

As specified by the Net Support guidelines, other local area networks (LANs) may be connected to the Ethernet Baseband if they comply with the following criteria.

[] Documentation of LAN provided for Net Support

[] LAN meets MCCD preferred connect method formats in connecting to
1. The universal cable plant
2. Ethernet
3. Microwave

[] Connecting devices must be among the following MCCD approved units.
1. Kinetics Bridges
2. Delni (DEC)
3. DECservers (DEC)
4. MUXserver (DEC)
5. Vitalink Bridge
6. DEMPER/DESTA
7. 3Com bridge
8. Novell bridge
9. PC Ethernet

STANDARD C: TWISTED PAIR FOR DUPLEX VOICE/DATA JACKS

The following standards shall be observed when planning for twisted pair voice/data jacks.

WIRING IN EXISTING BUILDINGS AND BUILDOUTS

Device Boxes in Existing Buildings and Buildouts
In existing buildings, the contractor shall install a standard 2x4-inch device box at each V/D jack location, with 3/4" conduit stubbed up to accessible ceiling space, or run to a wiring closet with a Telephone Mounting Board (TMB). This box shall be at a height consistent with all other device boxes in the area unless otherwise specified. Faceplates shall also be consistent with other faceplates in the area.

Jacks in Existing Buildings and Buildouts
Jacks shall be AT&T 106BFD or equivalent. Any proposed equivalence must be authorized by the District Telecom Coordinator. The jack shall be installed and numbered in sequence with other jacks in the building. The wiring diagram in Appendix A shall be precisely complied with.

Wiring to Jacks in Existing Buildings and Buildouts
There shall be at least two (2) three-pair twisted-pair 24-gauge wires to each jack with standard telco color-code (blue/white, orange/white, green/white) and wired in a standard telco RJ-11 configuration. The wiring diagram in Appendix A shall be precisely complied with.

WIRING IN NEW CONSTRUCTION

Wiring, device boxes, and jacks in new construction can be selected from one of two options. Option selection is subject to approval by the District Telecom Coordinator. It should be noted that once a wiring method has been selected, it must be followed without deviation. Following are the two options.

OPTION 1:

Wiring in New Buildings
There shall be at least two (2) FOUR-PAIR twisted-pair 24-gauge wires to each jack with standard telco color code (blue/white, orange/white, green/white, brown/white), and wired in a standard telco RJ-11 configuration. The "VOICE" RJ-45 shall support voice, data, or integrated voice and data services; also, standard, electronic, or digital sets, and control functions as required by the telephone system. This wiring shall be two (2) pairs of twisted-pair wiring. Voice cable pairs will be terminated on separate, individual 66 type connector blocks from the data cable pairs in each IDF. All voice pairs will then cross-connect to the building riser cable connector block located in the same closet, and will be extended to the main distribution frame. The other three RJ-45s will be wired with two (2) pairs of twisted-pair wiring

each. This wire will run from the outlet to the appropriate floor intermediate distribution frame, terminated on "DATA 66" type connector blocks and cross-connected to the building riser cable connector block located in the same closet and will be extended to the main distribution frame. The wiring diagram in Appendix A of this document shall be followed exactly.

Device Boxes in New Buildings
Contractor shall install a 2x2-inch device box at each V/D jack location, with 3/4" conduit stubbed up to accessible ceiling space, or run to a wiring closet with a Telephone Mounting board (TMB). This box shall be at a height consistent with all other device boxes in the area unless otherwise specified.

Jacks in New Buildings
Jacks shall be Leviton Infotap Quad 106 (USOC wiring scheme, 110 termination) or equivalent. Use of any equivalent jack must authorized by the District Telecom Coordinator. Jacks shall be numbered in sequence with a permanent material starting with the arabic numeral "1." These numbers will be located both on the faceplate and on the jack itself. The wiring diagram in Appendix A shall be precisely complied with.

OPTION 2:

Wiring in New Buildings
There shall be at least two (2) FOUR-PAIR twisted-pair 24-gauge wires to each jack with standard telco color code (blue/white, orange/white, green/white, brown/white), and wired in a standard telco RJ-11 configuration. The "VOICE" RJ-45 shall support voice, data, or integrated voice and data services; also standard, electronic, or digital sets, and control functions as required by the telephone system. This wiring shall be two (2) pairs of twisted-pair wiring. Voice cable pairs will be terminated on separate, individual 66 type connector blocks from the data cable pairs in each IDF. All voice pairs will then cross-connect to the building riser cable connector block located in the same closet, and will be extended to the main distribution frame. The other three RJ-45s will be wired with two (2) pairs of twisted-pair wiring each. This wire will run from the outlet to the appropriate floor intermediate distribution frame, terminated on "DATA 66" type connector blocks and cross-connected to the building riser cable connector block located in the same closet and will be extended to the main distribution frame. The wiring diagram in Appendix A of this document shall be followed exactly.

Device Boxers in New Buildings
contractor shall install a 4x4-inch horizontally mounted device box at each V/D jack location, with 3/4" conduit stubbed up to accessible ceiling space, or run to a wiring closet with a Telephone Mounting Board (TMB). This box shall be at a height consistent with all other device boxes in the area unless otherwise specified. this box shall have a common faceplate to cover it. MCCD will have final approval over the faceplates used.

Jacks in New Buildings
Voice/data station wiring shall consist of two (2) FOUR-PAIR station wires terminating in two duplex RJ-45 jack assemblies mounted horizontally in the 4x4-inch device box. The top duplex jack shall be an AT&T 106 BFD jack assembly or equivalent. The bottom jack shall be an AT&T AFD jack assembly or equivalent.

VOICE-ONLY AND DATA-ONLY OUTLETS

Wiring
The voice-only and data-only outlets shall consist of two (2) pair station wire terminating in an RJ-45 jack. The wire shall be run from the outlet to the appropriate floor intermediate distribution frame and terminated on the appropriate 66 type blocks (Voice or Data), then cross-connected to the building riser cable and extended to the main distribution frame.

Device Boxes
Contractor shall install a 2x4-inch vertically mounted box at each voice-only or data-only location, with a 3/4" conduit stubbed up to accessible ceiling space, or run to a wiring closet with a Telephone Mounting Board (TMB). This box shall be at a height consistent with all other device boxes in the area unless otherwise specified.

Jacks for Voice-Only/Data-Only
Each voice-only outlet shall be an AT&T 105AF assembly, and each data-only outlet shall be an AT&T 106AF assembly.

WIRE ROUTING TO TELEPHONE MOUNTING BOARD

Wires shall be routed to the Telephone Mounting Board in accordance with all applicable building codes. No station run shall be longer than 150 feet.

The wires shall be terminated at the TMB on telco standard "66-type" blocks. Separate blocks will be maintained for wires from the Voice or "A" side and the Data or "B" side. In an existing facility, patterns and documentation shall be followed according to existing facilities. In a new building, A- and B-blocks shall be installed side-by-side, where jack 1 terminates at the same place on the A-block as the B-block.

Each A and B termination shall be labeled with the correct jack number on both blocks.

DOCUMENTATION
Written documentation shall be provided for all installed communications outlets. A to-scale floor plan with jack locations indicated by triangles, and assigned number will be provided, along with any cross-connect information to existing cable plant. In the case of an existing facility, new jack documentation will be added to the existing documentation.

INTRABUILDING CABLE
On new buildings or substantially remodeled buildings, vendors must provide enough wiring to meet the immediate requirements listed by the college and provide for at least 30% spare capacity to each equipment closet. In addition, at least 25% of the wiring to the "B" jack must be run from the nearest equipment closet back to the Main Distribution Frame (MDF) from each building on campus.

PREAPPROVAL OF ROUTINGS/DESIGNS
Proposed "as-built" cable placement and routing drawings shall be submitted and approved by the college and the district telecommunications department prior to the start of any work.

WORKMANSHIP AND APPEARANCE
Workmanship quality and neatness of appearance shall be as important as the electrical and mechanical efficiency of the cable plant.

TERMINAL OUTLETS
Specifications for telecommunications terminal outlets are as follows:

1. Outlet boxes must be made of zinc-coated or cadmium plated sheet steel. Boxes shall be one piece stamped sheet steal; spot welding or riveting shall not be permitted. Outlet boxes in finished ceiling or walls shall be fitted with appropriate covers, set to come flush with the finished surface. Sectional switch boxes or utility boxes will be permitted where raceways are fished or otherwise concealed.
2. "Back-to-back" outlets in the same wall or "thru-wall" type boxes will not be permitted. An 8" (minimum) long nipple must be used to offset all outlets shown on opposite sides of a common wall to minimize sound transmission.
3. Unless specified by the college/center, outlets shall be located as listed below. Dimensions given are from finished floor to center line of outlets except panels. Adjust heights of outlets in masonry walls as indicated below; ensure that outlet boxes are set in corner of block or brick and align with the mortar joints. Outlet

height shall be consistent in one direction.

a. Standard Telecommunications Outlets shall be at a height to match electrical outlets in the room
b. Wall mounted Telecommunications Outlets shall be 48" for wheelchair access

DEVICE PLATES

Device plates for Telecommunications Outlets should match electrical plates in the room.

STANDARD D: DISTRIBUTION SYSTEM REQUIREMENTS

For the purpose of this document, the term "distribution system" refers exclusively to the twisted-pair, copper conductor, cable network, the major purpose of which is to interconnect station instruments and other terminal devices to the line cards of the switching systems (i.e., voice and data). It specifically does not include similar or other types of transmission facilities - cable or otherwise - that might be provided as transmission media between the centralized element (main node) and the distributed elements (remote nodes) of a switching system. Major elements of the distribution system include the following.

1. The standard exchange-type telephone cable itself which is defined as paired, multiconductor, thermoplastic-insulated, copper cable characterized by a mutual capacitance at 1000 Hz of 0.083 microfarad per mile.
2. Terminating hardware which typically includes the following: a distributing frame to interface the distribution network to the line side of the switch; distribution terminals to interface the distribution network to the station instruments and other terminal devices; and, intermediate cross-connect terminals in between to interface one segment of the distribution network to another.
3. Associated structures to support or house the cable: such as building-entry conduit, building conduit, pull-boxes, handholes, major underground conduit structures, and subsidiary conduit installed in association with direct buried cable for street crossings, etc.

CABLE SPECIFICATIONS AND DESIGN REQUIREMENTS

The following standards for cable specifications and design requirements shall be observed.

1. All cable provided must be standard exchange-type telephone cable as defined in the section on voice/data standards for twisted pair.
2. Only 24 or 22 AWG cable may be used in the distribution network; selection of wire gauge must be as follows:
    a. Intrabuilding cable must be 24 AWG and must meet all electrical code requirements.
    b. Interbuilding cable must be selected based on standard resistance design procedures, taking into account the signalling limits of the switching equipment. Loop resistance calculations shall be based on cable temp erasures of 68 degrees F.

3. Cable must be selected in accordance with the following selection chart.

Application	Conductor	Core	Sheath
Intrabuilding Cable (Vertical Riser)	Solid or Foam/Skin	Air	Alpeth or Alvyn
Intrabuilding Cable (Horizontal Cabling)	Solid	Air	Alpeth
Distributing Frame Terminating Stubs	Solid	Air	Alvyn
Interbuilding Cable (In Conduit)	Foam/Skin	Filled	ASP
Interbuilding Cable (Steam Tunnel)	Foam/Skin	Filled	Alpeth

4. Station wiring shall be uniform throughout the system except where specifically noted.
5. Station device power must be provided from the local distribution closet, the building distribution frame or switching system. All exceptions to this specification require prior approval by MCCD. Station wire must be run from each station jack to its associated local distribution closet, and from there must cross-connect to the building distribution frame. Unless otherwise approved, there must be at least one intermediate distribution frame per floor in each building.
6. Sufficient cable pairs must be run from the building distribution frame to the system main distribution frame (or the appropriate system node distribution frame) to support all wired voice, data and control functions on the outlet for all jacks. No building entrance cable will be less than 25 pair, unless otherwise approved.

DISTRIBUTING FRAME REQUIREMENTS

The following distributing frame requirements shall be observed.

1. Distributing frames must be metallic, preferably single-sided and equipped with "high density" connector blocks and terminal blocks. They must be sized to accommodate initial cutover requirements plus 25% growth.
2. Terminal blocks must be compatible with the distributing frame and connector blocks provided. Blocks of 100-pair each are desirable.
3. Distributing frame(s) must be grounded, by means of an insulated copper ground wire, to a low resistance earth ground, such as copper ground rods or a copper water pipe system. The maximum permissible resistance to ground, including the resistance of the ground wire, is five

ohms. The grounding system for the frame(s) must be separate from that provided for the switching equipment.

DISTRIBUTION TERMINAL AND INTERMEDIATE CROSS-CONNECT TERMINAL REQUIREMENTS

The following distribution terminal and intermediate cross-connect terminal requirements shall be observed.

1. Sufficient distribution terminals must be provided and properly located so as to limit station wiring runs to 150 feet maximum. Connecting blocks shall be compact, with quick-connect terminals (66 blocks).
2. Building entrance terminals must provide carbon protection for all interbuilding cable pairs terminated, and allow for the use of jumper cables to perform cross-connections from the front of the terminal.
3. Building terminals constructed in utility or similar type closets will require protective housings; as well as terminals constructed in work spaces, hallways and other such exposed areas.
4. Building terminals must be of modular construction to facilitate future additions and rearrangements.
5. To conserve wall and floor space, all large building terminals must be frame-mounted as opposed to wall-mounted. A large terminal is defined as one larger than 1200 total pairs terminated. The frame for such terminals must be sized to accommodate 25% growth beyond the number of pairs terminated initially. This requirement refers only to locations where cable is terminated not station wire.
6. Building-mounted distribution terminals, normally mounted against exterior building walls, inside a housing, must provide carbon block station protection, if needed, in addition to terminating facilities for cable pairs and inside station wiring.
7. Buried service wire terminals, used to feed buried service wires, need not provide station protection as such protection is provided at the station end of the service wire.

SPLICING

The following splicing requirements will be observed.

1. All cable splices must be protected from damage at sheath openings by mechanically protecting all conductors utilizing 3M Scotscast Brand Pair Saver 4458 or equivalent which must be approved by MCCD.
2. All cable shall be thoroughly cleaned and scuffed in an appropriate manner to insure a good mechanical bond when splicing or pressure blocking. Scotscast Brand #4435 nonconductive aluminum oxide abrasive strip, or MCCD approved equivalent, shall be used. All cable, filled or nonfilled, shall be thoroughly cleaned with a nontoxic, environmentally safe solvent, 3M Scotscast Brand 4414, 4415 or MCCD approved equivalent.

3. All splice closures for use on direct burial or underground nonpressurized systems shall be manufactured of clear self-extinguishing, cylindrical two piece tongue and groove fitting P.V.C. Spacer webbing shall be permanently adhered to the inside of the closure to maintain minimum compound fill. End caps must be tapered and flexible and be capable of separate cable entries. Rigid bonding and strain relief bar(s) must be an integral part of the finished closure. Nonenterable polyurethane compound shall be used unless otherwise specified. Reenterable polyurethane compound may be used when specified. 3M Brand Better Brand Gella 4411 (reenterable) or MCCD approved equivalents shall be used as appropriate.
4. All vacant or cable filled ducts shall be sealed with an 8 to 1 ratio expandable urethane foam, 3 M Scotscast 4416 or MCCD approved equivalent.
5. All cable splices shall be supported by a minimum of two cable hooks. Where vertical racking is not present, horizontal racking for support may be used utilizing 3M Brand RC-100 rack adapters or MCCD approved equivalent.
6. Underground cable splicing shall utilize 3M-MS2 4000 series supermini modular connectors. This will include use of "sealant boxes" (type 4075-S or 4076-S) for added moisture protection. This modular splicing will be used in the underground portions of the project. Vendor shall mark or tag the cable pair count spliced on the cable splicing housing.
7. Splicing of cross-connect terminals (and secondary cable access stubs) not in line or straight splice of diminish/taper splice locations shall utilize Scotchlok - ULG splicing connectors or MCCD approved equivalent.
8. 3M splicing closures or MCCD approved equivalent will be used for splicing throughout the cable system.
9. MS2 Modular Connectors will be installed with cable on the outside plant side of the Main Distribution Frame. The outside plant shall be spliced to incoming cables by the vendor utilizing splicing procedures detailed above.

ASSOCIATED STRUCTURES

The following requirements for associated structures, conduits and pull-boxes shall be observed.

Conduits

1. All conduit runs less than 100 feet from point-to-point shall not contain more than two 90 degree standard factory bends or three 90 degree 24 inch radius bends.
2. All conduit exceeding 100 feet from point-to-point or exceeding two 90 degree bends shall contain accessible pull boxes.
3. Conduit runs shall not contain square or oval conduit fittings.

4. All feeder conduits to telephone terminal cabinets shall enter top or bottom on the extreme right or left side of the box.
5. Intrabuilding conduit guidelines are as follows:
    a. 3/4" conduit shall be placed for every telecommunications outlet
    b. 1" conduit shall be placed for every video outlet
    c. There shall be one (1) telecommunications outlet for every workstation, every conference room and every classroom with special purpose rooms (i.e. teleconference rooms) having additional outlets added as specified by the college/center.
    d. There shall be three (3) video outlets for every classroom and a minimum of two (2) video outlets for every conference room with special purpose rooms having additional outlets as specified by the college/center.
6. Vendor shall provide 3/32" O.D., 200 lbs. strength polyethylene pull lines in all conduits with less than 50% fill ratio.

Pull-boxes
1. Pull-boxes shall be provided in accessible positions. Screw covers shall be provided and the box shall be labeled "telephone."
2. Pull-boxes shall have the following sizes:
    a. 6" x 6" x 12" for 3/4" conduit runs
    b. 4" x 4" x 36" for 1" through 2 1/2" conduit runs
    c. 6" x 6" x 26" for 3" and larger conduit runs.

STANDARD E: PIN OUTS/CONNECTORS/TERMINATION DEVICES

Pin outs for data adapters, punch block, and terminal servers are included in Appendix B of this document. More detailed information may be obtained by contacting the Manager of Repair Services at the Maricopa Community College District Office.

STANDARD F: COAXIAL CABLE-BASED BROADBAND

The coaxial cable-based broadband network must be identified with the following characteristics. Information in this section was extracted from pages 122 through 140 of the **Telecommunications Request for Proposal (RFP)** document.

GENERAL SYSTEM SPECIFICATIONS

1. Broadband networks shall be mid-split type system capable of distribution of 5 to 400 MHz (or more) carrier for television, T1 carrier and pilot carriers.

2. The broadband system shall be designed for Automatic Slope/Level Control operation, preferably using VHF television carrier frequencies.

3. Headend of the system will be the Media Center of the campus or facility unless otherwise specified by MCCD and cabling shall utilize MCCD tunnel systems and separate conduit as specified in this document and/or identified on supporting drawings.

4. Coaxial cable fittings and connectors shall have a characteristic impedance of 75 ohms

5. A maximum of two line extenders will be installed in cascade.

6. Splitting of trunk lines and distribution lines will be permitted but trunk and distribution lines shall not be tapped for user connections.

7. Distribution cable shall be utilized to provide tap-offs to individual user locations; such lines shall be connected to a trunk-line cable through high-isolation bridging amplifiers.

8. Built-in test points shall be provided for system maintenance at input and output of trunk amplifiers and distribution amplifiers.

9. All passive devices shall be rated to pass a continuous ten (10) ampere of AC current at 60V AC, except multitaps which shall be rated to PASS a continuous six (6) amperes at 60V AC.

10. The system shall be operational between -40 degrees and +140 degrees, Fahrenheit.

11. System shall be designed for 200% tapping, based on the location count for building(s) to currently be served. If this count indicates a requirement for more than eight (8) drops on a distribution line, a directional coupler shall be installed with an output 10dB higher than the

minimum multitap specified.

12. System shall meet all applicable FCC regulations in effect at the time of construction or modification.

ACTIVE EQUIPMENT SPECIFICATIONS

1. All active circuitry in the equipment used shall be fully solid state. Fuses or circuit breakers shall be provided for protection of the equipment from damage due to overload.

2. All equipment shall be remotely powered through the coaxial cable by means of regulated transformers, and equipment shall be so designed as to cause only alternating current to flow in the coaxial cable. A suitable RF power line filter shall provide not less than 46 dB of RF attenuation on the AC path. Circuit breakers shall be provided in any devices that are to be connected to the power source.

3. All trunk amplifiers of the system shall operate with uniform output levels, except as affected by temperature and peak-to-valley specifications.

4. No more than 40 dB of trunk cable shall exist between active devices without both containing Automatic Level and/or Slope Control.

5. System shall be equipped with redundant power supplies at the headend location.

CABLE SPECIFICATIONS

1. All coaxial cables used in the system shall have a nominal characteristic impedance of 75 +/- 2 ohms over the entire specified frequency range, except as noted below.

2. All trunk and feeder cable in the system shall be tested for return loss and attenuation on site.

3. All trunk lines shall use .750" aluminum cable. Distribution (feeder) lines shall use .500" aluminum cable.

4. All intrabuilding trunk and feeder cables in the system shall have an aluminum outer conductor, foam polyethylene dielectric, and copper-clad center conductor.

5. All interbuilding trunk and feeder cable in the system, within conduit, shall have an outer black jacket of polyethylene (.040" min.), aluminum sheath outer conductor with a flooding compound between the jacket and aluminum sheath, foam polyethylene dielectric, and

copper-clad center conductor.

6. All direct buried trunk and feeder cables in the system shall have a black outer jacket of polyethylene (.040" min.), steel armor protective shield, black polyethylene inner jacket (.040" min.), aluminum sheath conductor with flooding compound between the inner jacket and the aluminum sheath, foam dielectric, and copper-clad center conductor.

7. Drop lines shall use quad-shielded RG-6 type cable and all RF ports shall be terminated with 75ohm resistors.

8. Attenuation shall be based on the manufacturer's maximum rated loss in dB per 100 feet at 50 and 400 Mhz, at a stabilized ambient temperature of 60 degrees, Fahrenheit, corrected to 110 degrees, Fahrenheit, for system layout design.

CABLE TESTING

Cable frequency sweep or time domain reflectometer testing shall be performed on all trunk and feeder cables after installation in order to detect any cable defects or damage caused during installation. The cable structural return loss shall be better than 30 db.

SYSTEM PERFORMANCE SPECIFICATIONS

1. True structural return loss shall be 30 dB minimum from 5 to 400 MHz.

2. Trunk Cables shall meet the following specifications for performance between any two (2) self-contained points of the trunk transportation systems with carriage of 35 VHF channels.

3. Gain Versus Frequency Response (peak-to-valley) within the respective pass band, shall be no greater than 0.5 dB across any 6 MHz segment.

4. Maximum overall excursion from ideal Gain Versus Frequency Response (50 to 400 MHz) at any trunk amplifier station shall not exceed N/10 + 1 dB.

5. Carrier-to-Noise within a 4 MHz bandwidth at 85 ohms shall be (59-10 logN) or better.

6. Carrier-to-Hum Ratio shall be (70-20 logN) or better.

7. Carrier-to-Cross Modulation shall be (85-20 logN) or better.

8. Carrier-to-Second Order Ratio A-B singular discrete component shall be equal to or better than (85-10 logN)

for cascades 10 amplifiers or less.

9. Carrier-to-Composite Triple Beat Ratio shall be measured with system fully loaded with at least 40 channels and shall be (82-20 logN).

10. Trunk operating levels shall not vary more than +/-1.5 dB over the temperature range 0-100 degrees Fahrenheit, and +/-2.75 dB over the temperature range -40 to+140 degrees, Fahrenheit.

11. For systems up to and including twenty trunk amplifiers, bridger and two line extenders, the combined forward trunk and distribution system will deliver signals at each user port that will meet or exceed the following specifications over the temperature range of 0-100 degrees Fahrenheit, unless otherwise indicated.

12. Peak-to-Valley (any 6-Mhz video channel) 0.75 dB

13. Peak-to-Valley, 50-400 MHz +/-(N/10 + 2.5)

14. Carrier-to-Noise (4 MHz bandwidth) 45 dB

15. Carrier-to-Hum (includes PS switching frequency) 43 dB

16. Carrier-to-X-Mod (NCTA STD 0267, 54 channels) 51 dB

17. Carrier-to-Second Order (Single), 63 dB

18. Carrier-to-Composite Triple Beat, 49 dB

19. Carrier-to-Echo Ratio (greater than 2 microsecond displacement), 40 dB

20. Differential Gain, 0.5 dB

21. Differential Phase, 1 degree

22. Differential Group Delay ˜ 58.83 MHz, 18.5 N sec. 1 as referenced to 55.25 MHz, 17.5 N sec. 2

23. Minimum Visual Carrier Level, Ch. W (55 degrees.Fahrenheit), +10 dBmV 3 ; Maximum , +15 dBmV 3

24. Minimum Visual Carrier Level, Ch. 2 (55 degrees Fahrenheit), +4 dBmV 3; Maximum (6 dB variance from W)

25. Maximum Visual Carrier Level Change from 0-100 degrees, Fahrenheit, 3.0 dB

6

26. Isolation between User locations, 36 dB 4

RETURN DISTRIBUTION
Except where indicated otherwise, and based on 50' RG 6/U Drop Cables, the following specifications are expected performance (except as modified by Peak-to-Valley Specifications) between any two self-contained points in each transportation system at operational output levels, with bi-directional capabilities utilized (carriage of 3 return VHF channels), at 55 degrees, Fahrenheit.

1. The Gain Versus Frequency response within the respective pass band shall be no greater than 0.75 dB.

2. When measured at the last balance temperature, the Frequency Response at any and all amplifier stations will not exceed N/10 + 1 dB, 6-30 MHz.

3. The Carrier-to-Noise within a 4 MHz bandwidth at 75 ohms shall be (67-10 logN+), where N+ is the total number of return distribution amplifiers converging at any trunk station.

4. The Carrier-to-Hum Ratio shall be 1.0% or better.

5. The Carrier-to-Cross Modulation Ratio shall be (98 - 20 log N) or better.

6. The Carrier-to-Second Order Ratio (A-B) singular discrete component shall be (75 - 10 log N).

7. Operating levels shall not vary more than (.0012 x dB of cable x degrees Fahrenheit of temperature change,), or more than 2.0 dB from those levels achieved at balance, as measured at the output of any AGC station over the temperature range of 0-100 degrees, Fahrenheit. Should the ambient temperature exceed these limitations, the levels will not vary more than an additional 2.0 Db.

8. Chroma delay, carrier plus 3.58 MHz "relative", shall not exceed (N x 10 nsec) for a TV channel whose visual carrier is 19 Mhz.

SYSTEM ALIGNMENT

1. Upon completion of the system installation, it shall be the responsibility of the Contractor to perform the necessary alignment to insure proper system operation.

2. The forward path shall be aligned utilizing a sweep or variable signal generator located at the headend and a spectrum analyzer or a field strength meter at each trunk amplifier output and at the midpoint of the longest distribution branch for each distribution amplifier. Adjust each trunk amplifier for flat output at the

forward output test point and adjust each distribution amplifier for flat output at the midpoint. Thus, each forward trunk amplifier compensates for the slope of the cable that precedes it and each forward distribution amplifier compensates for the slope of the cable that precedes it as well as one-half of the cable that follows it. Amplifier output levels shall be as specified (under System Performance)_when TV visual carriers of 56 dBmV are injected into the headend combiner ports. The input levels may vary +/- 2 dB because of tolerance build-up.

3. The reverse path shall be aligned utilizing a sweep or variable signal generator located at the midpoint of the longest distribution branch for each distribution amplifier. Adjust each distribution return amplifier to obtain flat input at the specified level into the following trunk return amplifier when TV visual carriers of 56 dBmV are injected into the midpoint. Adjust each trunk return amplifier to obtain a flat input, at the specified level, into the following trunk return amplifier or out of the headend return splitter ports. (The output levels may vary +/- 2 dB because of tolerance build-up.) Thus each distribution return amplifier compensates for the cable that follows it, as well as one-half of the cable that precedes it, in the return direction and each trunk return amplifier compensates for the slope of the cable that follows it in the return direction.

PROOF OF PERFORMANCE

1. Before the Contract can be considered complete, the Contractor shall conduct a Proof-of-Performance test to demonstrate the system's ability to operate within the requirements of these specifications. _Testing shall be performed in the presence of MCCD Project Manager or designee. One week advance notification is required by the Project Manager.

   Additionally, the Contractor will furnish all equipment and personnel to collect, compile, and edit the required test data into a written report as described below. In the case of a new system installation, or extensive modification to an existing system, the Contractor shall submit a final Test Plan to MCCD for approval at least 30 days before the final testing is to begin.

2. On-site measurements for each segment will be conducted and recorded at two test sites. One of the test sites shall represent the longest system cascade and the other may be designated by the MCCD Project Manager or designee. The system shall be tested for the following
   a. Visual carrier frequencies
   b. Aural carrier frequencies

c. Visual carrier levels
d. Aural carrier levels
e. TV and related frequency spectrum flatness
f. Low frequency disturbances
g. In-channel frequency response
h. System S/N ratio
i. System co-channel interference levels
j. Intermodulation and spurious signal levels
k. Subscriber terminal isolation
l. Cable and equipment radiation levels
m. any other measurements required by FCC Technical Standards, Part 76.

3. The following shall also be included in test data.
   a. Forward and return input and output levels at each amplifier and stand-alone equalizer.
   b. Forward sweep response at each trunk amplifier output and at mid-span for each distribution amplifier.
   c. Return sweep responses at each trunk amplifier input from each branch feeding each trunk amplifier.
   d. Additional supportive documentation will be appendixed in the following form: Detailed list of test equipment used, to include nomenclature, model, serial number, and last date of calibration.
   e. Detailed block diagrams for each measurement procedure, with verbal description of measurement technique.
   f. Name of personnel who performed the tests.
   g. Formulas, charts, etc., used to compile data into standard format.

Upon completion of on-site test measurements, all collected data shall be compiled and edited by the Contractor into a report which details system performance. Three copies of the final report will be submitted to the MCCD Project Manager. MCCD reserves the right to contract a third party of its own choosing to verify any or all Proof-of Performance results.

PHYSICAL INSTALLATION

1. All equipment shall be installed in a neat manner and to the complete satisfaction of the MCCD representative. All equipment installation and wiring shall conform to the National Electrical Code, applicable local codes and the practices of the National Cable Television Association.

2. All equipment power wiring and grounding shall conform to the National Electrical Code and applicable local codes. Electronic Equipment, Racks, Amplifiers, Power Supplies, Antennas, and Towers shall be grounded using a No. 6 solid copper wire.

3. Cable shall be adequately supported at least every 5 feet, connectors shall be suitable for the cable specified. Cable supports must not cause crushing or distortion of the cable nor cause bends less than the minimum permitted for each type cable as specified by the cable manufacturer.

4. Physical separation between input and output cables shall be maintained within racks and terminal cans. All cables shall be labeled as to input and output and by runs, per drawings, at each device the cable attaches to.

5. All penetrations through fire walls and all vertical penetrations through floors shall be treated to maintain compliance with applicable fire codes.

6. All trunk, feeder and drop cabling through offices, administrative areas and classrooms shall be concealed in trays or raceway appropriate to the space. Directional coupler and tap housings shall be concealed in metal boxes sized sufficiently to allow for acceptable cable bending radii.

7. All exposed 1/2 and 3/4 inch cable shall be at least 8'-6" above the floor whenever possible. All drop cable that is required to be in wiremold shall be in the wiremold from 8' above the floor, or from false ceiling if one exists, down to the termination. Terminations shall be at the same height above the floor as existing electrical outlets in each room.

8. All cabling shall be routed to prevent interference with any existing systems such as access boxes, ventilation mixing boxes, access hatches to air filters, switch panels, fire alarm equipment, clock systems, lighting fixtures, etc. The Contractor will be responsible for re-routing any cabling that is not acceptable to MCCD, at no cost to MCCD.

9. All equipment shall be suitably mounted in cabinets, closets or tunnels. Equipment suspended by its coaxial cable or connector is not acceptable. Shop drawings of proposed mounting of equipment will be submitted for approval by MCCD.

10. The recommended method of mounting amplifier housings is to securely mount a plywood backboard on the wall. Then fasten two metal D-rings to the plywood and then mount the amplifier housing to the D-rings using the clamps supplied with the housing. Securely mounting the D-rings directly to the wall is acceptable if the wall construction permits this. Whenever possible the amplifier shall be mounted such that the lid hinges down,

providing access to the interior. In all cases choose a mounting location that will permit the lid to be fully opened without interference from any other structures.

11. All taps must be mounted in order to provide easy, direct access to the tap ports. Splitters and taps located in ceiling spaces, trays or raceways shall be securely attached to the adjoining structure such as the ceiling support wire or tray edge.

12. Splitters or taps shall not be solely supported by the cable. The cable should also be supported within three feet either side of the splitter, tap or amplifier.

13. All outdoor and underground tunnel or conduit connections and splices shall be weatherproofed through the use of shrink tubing with precoated sealant or other approved methods. Direct buried cabling shall be of self-sealing compound with armor. Underground cable in tunnels and conduits shall be of self-sealing compound as specified.

14. Splices shall be kept to a minimum and only permitted where specified or when installation around existing structures/equipment is not reasonably without splicing.

15. User ports shall be at the same height as existing electrical outlets in each room unless directed otherwise by MCCD. Flush mounted outlets shall be installed to blend with existing outlets. The drop cabling shall not be subjected to sharp edges during installation through wall or ceiling structures. The installation of cable around removable devices, instruments, sub panels, etc., shall be provided with adequate support, length, protection, and flexibility so that the cable is not disturbed when the unit is removed.

16. All interior drop cabling, CAB-6 flexible cable, will be routed in the best way to keep a minimum length and neat appearance.

17. Drop cable corridor crossings shall be attached to building structure, run in conduit, or run in wiremold where exposed. Crossings shall be in wiremold where trunk/feeder cable is indicated to be in tray or wiremold.

18. When the drop cable is run parallel to trunk/feeder cable it shall be attached to the trunk/feeder cable at least every 30".

19. Drop cable that must be surface mounted shall be inside of conduit, raceway, or wiremold to protect it from damage.

20. All drop cable shall consist of a multishielded FEP jacketed cable with foamed polyethylene dielectric from the taps to each outlet as required.

21. Trunk and distribution feeds within buildings shall be installed above the false acoustic tile ceilings per the National Electrical Code whenever possible, otherwise shall be installed in conduit, wiremold or cable tray.

22. Percussive drilling is NOT permitted, only core or rotary drilling which results in clean, sharp holes is allowed.

23. Exposed 1/2 inch cable shall be supported at least every 5 feet.

24. The use of polyethylene jacketed seamless aluminum cable with foamed polyethylene dielectric is required for distribution within each building. The use of polyethylene jacketed, flooded, seamless aluminum cable with foamed polyethylene dielectric is required for use in the underground tunnels and conduits.

25. Provide service loops (6" minimum) at each device to allow for thermal expansion and contraction and to allow for possible replacement of the device.

26. Any cable that is required to be installed in air plenum spaces shall meet NEC 725-2(b) and be approved for use in air plenums without conduit or the cable shall be installed in conduit.

27. Any part of the system (installation or equipment) not meeting the requirements of this specification shall be corrected at no cost to MCCD.

RECOMMENDED GUIDELINES

GUIDELINE A: ENGINEERING/ENVIRONMENTAL CONSIDERATIONS

Design of a reliable, energy efficient, and safe data center facility requires careful planning in two general areas: "general considerations" and "essential elements." General considerations deal with all aspects of site selection and planning, and environmental considerations. Essential elements include electrical considerations, grounding, electromagnetic interference, temperature and humidity, and airborne contamination. This section provides requirements for each of the two areas, and refers you to documents where detailed information on each consideration may be obtained.

GENERAL CONSIDERATIONS

General considerations include site selection, site planning, and environmental considerations. Site selection planning, whether for a new or existing building, deals with space and location considerations. Site planning considers flooring, fire and safety, security, lighting, acoustics and other considerations. Environmental considerations include access flooring, static loading, fire suppression systems, and environmental products. A fire prevention plan must protect the facility from fire and high temperatures. The plan should employ a fire protection system which includes sensitive and immediate-response detectors, accessible controls, and a fire extinguishing agent (halon 1301). Information on these and other topics, which must be considered for a successful site selection and preparation, can be found in **Chapter 1 of the Computer Facilities Design Guide**.

A well designed and cost-effective security system should be implemented to protect the facility. Security systems can be configured to provide controlled access to facilities by authorized personnel, to monitor strategic areas, and in general, to protect confidentiality and to discourage unauthorized use of resources. Since there are many types of security systems, factors such as budget, convenience, and the desired level of protection should be considered. Security systems range from simple entry keys to sophisticated card-entry systems supplemented by closed-circuit television monitoring systems. Card key systems can provide controlled access to areas, along with audit information for each access station. More detailed information on security considerations can be found in **Chapter 1** of the **Computer Facilities Design Guide**, and the **SECURITY SYSTEMS** guideline section in this document (**GUIDELINE: SECURITY SYSTEMS**).

ESSENTIAL ELEMENTS

Elements which are essential to the design of a computer facility include electrical and grounding, electromagnetic interference, temperature and humidity, and airborne contamination. The electrical and grounding phase is one of the most important of the design project. Adequate, properly grounded, and reliable power is crucial to the successful operation of any data center. Commercial power distributed to your building is not always within acceptable standards. A number of steps can be taken to alleviate this problem. First, a dedicated power source with an isolated ground should be considered. A power distribution/conditioning system is also recommended. It should be remembered that all electrical and grounding specifications must meet the National Electrical Code Standards. **Chapters II and III of the Computer Facilities Design Guide** provide considerable reference material in these two areas.

Control of electromagnetic interference (EMI) and static electricity are essential to a smoothly operating computer facility. EMI sources must be identified and controlled. Proper dissipation of static electricity is essential to avoid damage to equipment. Detailed information on EMI and static electricity can be found in **Chapter IV** of the **Computer Facilities Design Guide**.

Finally, a properly designed facility must include plans for temperature, humidity, and airborne contamination control. It must be capable of operating 24 hours per day, 365 days per year, while maintaining precision temperature control at 72 degrees, and a constant 45% humidity level. More detailed information on these considerations can be found in **Chapters V and VI** of the **Computer Facilities Design Guide**.

In summary, information on the following considerations can be found in the indicated chapters of the **Computer Facilities Design Guide**.

Chapter 1:	General Considerations
Chapter 2:	Electrical Considerations
Chapter 3:	Grounding
Chapter 4:	Electromagnetic Interference
Chapter 5:	Temperature and Humidity
Chapter 6:	Airborne Contamination

GUIDELINE B: T1/DS1 MICROWAVE NETWORK

**** to be completed ****

GUIDELINE C: RELATIONSHIP OF VOICE-DATA-VIDEO COMMUNICATIONS TO ELECTRICAL ENVIRONMENT

Guidelines explained in this section are intended to establish the physical relationship between voice-data-video (VDV) cabling and electrical power cabling for both external cabling and internal cabling.

EXTERNAL CABLING

The following guidelines shall apply when cabling is being installed offsite, leading to a facility or building.

[] If possible, the VDV cabling and electrical cabling should be installed in separate excavated trenches. However, if the same common trench must be used, then the electrical cabling must be installed at the bottom of the trench and covered by a concrete cap in accordance with the project specifications. The VDV cabling shall be installed at least 24 inches above the electrical cabling in the same trench.

[] The VDV and electrical cabling shall have separate manholes, pull boxes, and junction boxes as they approach and enter the facility or building.

INTERNAL CABLING

The following guidelines shall apply when cabling is installed within a facility or building.

[] The VDV and electrical cabling shall be installed in separate conduits whenever conduits are required by the project specifications.

[] In the rare case where the VDV and electrical cabling must run in the same raceway, the VDV and electrical cabling must be kept separate by a physical barrier which is color coded in such a way to indicate the difference in the two types of cabling.

GUIDELINE D: SECURITY SYSTEMS

The Maricopa Community Colleges currently do not have sufficient experience with security systems to establish standards. Several colleges have installed various types of security systems but no two systems are the same. The evaluation of protective features provided by a security system must take into account the cost of such features in comparison to the property value which the security system will protect. Not all areas of a facility need be protected by a security system. Instead, security protection should be considered only for those areas which can cost justify the protection.

Security protection systems vary depending on whether items (computer equipment, books, computer disks, etc.) or spaces (rooms, halls, offices, etc.) are to be protected. Other types of security protection systems control personnel access to areas where hardware, software, or information are kept.

The following outline addresses areas and levels of control. It is intended as a reference guide to show types of protective features to be considered when planning for a security system. The outline is organized by type of protection to be addressed (space versus access control, etc.).

- A. Perimeter control
  - 1. Card reader
    - a. Reader only
    - b. Reader with keypad
  - 2. Door contacts
- B. Access (room) control
  - 1. Card reader
    - a. Reader only
      - 1) Ability to cancel user's access
      - 2) Identification of users accessing area
    - b. Reader with keypad requiring entry of personal identification number (PIN)
      - [] Eliminates use of card if lost
    - c. Card access system
      - 1) Complete system including card readers, microcomputer, security management software, printer, card encoder, and distributed processing modules
      - 2) Vendor
        - [] Kidde Automated Systems
  - 2. Fingerprint reader
    - a. Requires "personal" identification of user
    - b. Eliminates security compromise due to loss of security card and/or compromise of PIN
    - c. Potential vendors
      - [] Fingermatrix, Inc.

C. Space (room, hall, etc.) protection
  1. Passive infrared
    - [] Ceiling or wall-mounted circuit designed to detect movement
  2. Glass breakage detector
    - Ceiling or wall-mounted audio discriminator circuit designed to detect common sound of shattering glass
  3. Video monitoring
    - a. Time-lapse video recorder
      - 1) Provides 24-hour recording of area(s) being monitored
      - 2) Vendor
        - [] Panasonic
  4. Digital video compressor
    - a. Combines multiple (up to four) cameras into one video signal for displaying, transmission, or recording
    - b. Vendor
      - [] Robot Research, Inc.
  5. Noise monitoring
  6. Relationship between card reader for access and card reader for space protection
    - [] May require use of two separate card readers
      - 1) to grant access through door, and
      - 2) to deactivate infrared or sound detectors in a room

D. Item (computer, disk, book, etc.) control
  1. Rf-based system
    - a. Non-magnetic system which can be used with magnetic media without rising loss of data/information
    - b. Rf detectors (sensing antennae) placed at entry\exit point(s)
    - c. Size of detection tags permits placement on small items, such as 3.5" diskette and cassette tapes
    - d. Detection tags can also serve as bar code labels
    - e. Vendors
      - [] Check/point Systems, Inc.

E. Data access
  1. Fingerprint reader offers alternative to passwords for accessing computer files, servers, etc.
  2. Vendors
    - [] Fingermatrix, Inc.

F. Uninterruptible power system for security systems
  - [] Recommended for any security system to ensure that a power failure will not render the system useless.

GUIDELINE E: ENTRANCE FACILITIES

Entrance facilities are defined as the cabling provided by USWest Communications to connect the on-site interbuilding wiring to the local exchange. Entrance facility size should be based upon an estimate of total voice/data needs anticipated when the college is fully built and equipped. Conduit will be sized accordingly.

Routing of entrance facilities to the MDF will be engineered by USWest Communications for approval by the district telecommunications department.

GUIDELINE F: OUTSIDE PLANT CONDUITS

For the purposes of this document, outside plant is defined as the interbuilding conduit structure and cabling used for voice and data communications (twisted pair), broadband, and Ethernet. The following guidelines should be observed.

UNDERGROUND CABLE

Cable being installed in conduit shall be handled with care and protected from being kinked. A kink is defined, for purposes of this document, as violation of the manufacturer's specified Minimum Bend Radius for each type cable involved. Cable shall not be formed to cause the outside sheath to wrinkle. Unsheathed cable shall not be left exposed to the elements. Cable will be unrolled from the shipping spool and not allowed to spill from the side of the spool.

MANHOLES

The standard size for manholes used with major underground conduit structures of five ducts or more will be 6' wide x 12' long x 7' high; pullboxes with minimum dimensions of 4' wide x 5' long x 4' high may be used instead of manholes for major conduit structures of four ducts or less.

CONDUIT SIZE

Conduits for outside plant cabling will be sized proportionately to the size of the cable required to feed individual buildings. At a minimum, there shall be one (1) 4" conduit for telecommunications wiring (twisted pair), one (1) 4" conduit for video wiring (coaxial cable) one (1) 4" conduit for data communications (Ethernet fiber or coax), and one (1) 4" conduit for spare.

GUIDELINE G: CONDUITS WITHIN BUILDINGS

Conduit structures must be provided for all voice/data/video cabling within buildings. The dual voice/data jack requires three-quarter inch (3/4") conduit. The Video cabling requires one-inch (1") conduit. Additional three-quarter inch (3/4") conduit may be required for data-only and/or LAN jacks. Sizing of conduit should be done in conjunction with the Maricopa Community College District Office Information Technologies Services Department.

GUIDELINE H: PHONENET LANS

This guideline includes PhoneNET LAN specifications along with MCCD recommended hardware. Cable limitations are also cited.

SPECIFICATIONS

Following are PhoneNET specifications:

[] Functional Appletalk compatibility: 100% hardware and 100% software.

[] Topology: parallel bus, low-resistance transformer isolated, floating ground.

[] Signal Standard: EIA modified RE-422, balanced voltage.

[] Signaling Speed: 230, 400 Baud. PhoneNET system is speed independent and can support network signal rates in excess of 1M baud.

[] Signal Encoding: FMO (bi-phase) space.

[] Frame Format: SDLC (Synchronous Data Link Control).

[] Maximum Length: 3000 feet between repeaters or bridges, or per branch on a star controller for Macintosh equivalent devices.

[] Maximum Number of Connections: 32 recommended per logical network (254 address space).

[] Node Identifications: AppleTalk logical address is self-configuring, no user action required.

[] RFI and Noise Immunity: No RFI passive taps, noise immunity greater than 600 volts.

MCCD RECOMMENDED HARDWARE

Following Shiva Corporation hardware is recommended.

[] NetBridge™: Zone-to-Zone Bridge, extends device limits by creating a second zone, does not extend any line length limits.

[] FastPath™: The FastPath hardware connects a LocalTalk or compatible network to a thick or thin Ethernet or compatible network. FastPath gateway program is called K-STAR (Kinetics-Style Addressing and Routing). K-STAR contains software modules which implement ApplelTalk Phase 1 and Phase 2 protocols, transition bridge software, TCP/IP protocols (including UDP, ICMP, and RIP), DECnet, and SNMP. The user provides configuration data to the gateway, and downloads the K-STAR gateway program using the FastPath Manager Macintosh application.

[] StarController™: StarController is an active Star hub. It extends the maximum wire length of a network, but does not provide for any device extensions. Also, StarController is a twelve-leg hub with an additional management port. Each leg can be branched into four additional legs.

[] PhoneNET™: PhoneNET adapter is a basic hardware unit which attaches a computer or other device to the network wires. The connector provides necessary signal link for communicating between devices; each device must be configured with a PhoneNET adapter. It should be noted that MCCD Computer Repair stocks quality cost-effective PhoneNET or compatible adapters.

CABLE LIMITATIONS
The following cable length limitations are standard industry guidelines. Maximum cable length is without an active star hub or repeater.

NUMBER OF BRANCHES	LENGTH IN FEET PER BRANCH (22-gage wire)
1	3,000
2	1,500
3	1,000
4	750

Line limitations may be reduced by number of connections and wire gauge. Modular cable is often 26-gauge, and will double wire consumption. For example, an entirely Modular Daisychained network will need to be less than 1,500 feet, with no more than 20 connectors.

Note: Some network devices, such as the FastPath, have signal output levels that are significantly less than that of a Macintosh. These devices must be located closer to the StarController than a Macintosh. The branch cable connecting these devices may not exceed 1,500 feet. Ensure that the port to which the branch cable is connected has no additional branches connected to it, and that the device is the only one on the branch.

APPENDIX A
WIRING FOR BUILDINGS

WIRING FOR EXISTING BUILDINGS AND BUILDOUTS
106BFD Voice and Data Jacks*

WIRE	PIN NUMBER
White/Blue	1
Blue/White	2
No Connection	3
White/Green	4
White/Orange	5
Orange/White	6
Green/White	7
No Connection (N/C)	8

*Note that both voice and data jacks are wired identically

WIRING DIAGRAM FOR NEW BUILDINGS: OPTION 1 - VOICE
LEVITON InfoTap Quad 106 Jack for VOICE

WIRE COLOR	PIN DESIGNATION
White/Blue	1G
Blue/White	1R
White/Orange	1B
Orange/White	1Y
White/Green	2G
Green/White	2R
White/Brown	2B
Brown/White	2Y

WIRING DIAGRAM FOR NEW BUILDINGS: OPTION 1 - DATA
LEVITON InfoTap Quad 106 Jack for DATA

WIRE COLOR	PIN DESIGNATION
White/Blue	3G
Blue/White	3R
White/Orange	3B
Orange/White	3Y
White/Green	4G
Green/White	4R
White/Brown	4B
Brown/White	4Y

APPENDIX A
WIRING FOR BUILDINGS
(Continued)

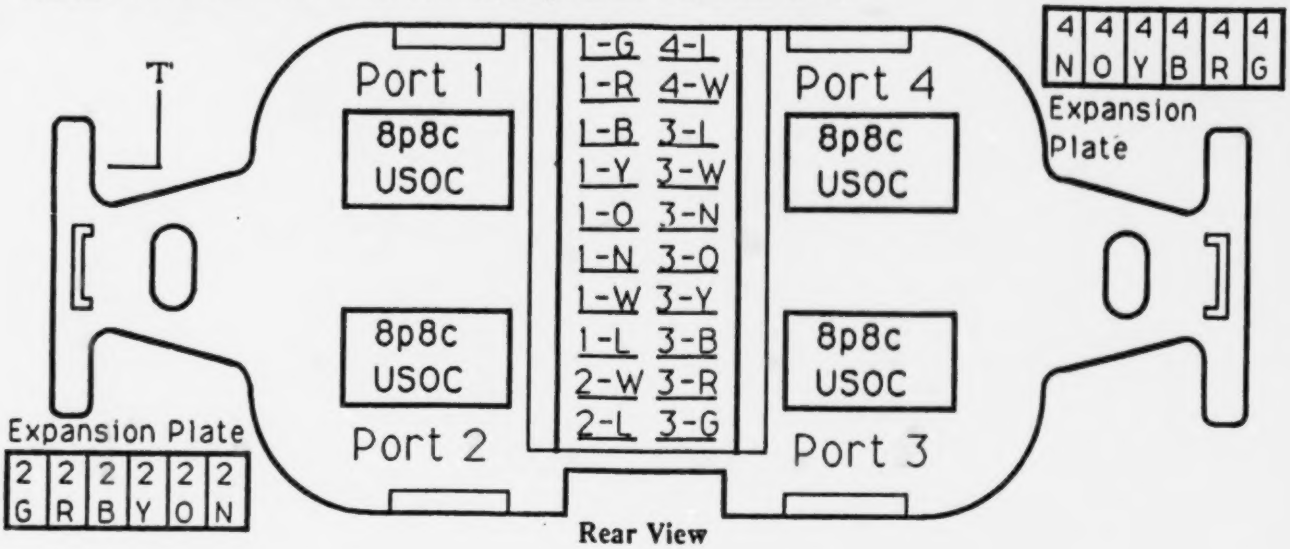
InfoTap™ Quad 106 Wiring Instructions

Jack conductors are wired per the diagram below.

Example: 1-G= green wire of port 1 (top left jack as seen from the rear of the device when device is oriented as in diagram below.) Complete connection by installing insulation displacement caps (provided with 110 connectors) or using appropriate tool (110 or Krone®).

Wire color codes: G=Green; R=Red; L=Blue; O=Orange; B=Black; Y=Yellow; N=Brown; W=White

NOTE: For monument or floor box use, snap-off the T's of both ends.



Rear View

APPENDIX A
WIRING FOR BUILDINGS
(Continued)

WIRING FOR NEW BUILDINGS: OPTION 2 - VOICE AT&T 106 BFD AND AT&T 106 AFD DUPLEX JACKS

VOICE RJ-45 DUPLEX JACK (TOP HALF)

WIRE	PIN ON JACK
White/Blue	1
Blue/White	2
No Connection (N/C)	3
No Connection (N/C)	4
White/Orange	5
Orange/White	6
No Connection (N/C)	7
No Connection (N/C)	8

VOICE RJ-45 DUPLEX JACK (BOTTON HALF)

WIRE	PIN ON JACK
White/Green	1
Green/White	2
No Connection (N/C)	3
No Connection (N/C)	4
White/Brown	5
Brown/White	6
No Connection (N/C)	7
No Connection (N/C)	8

WIRING FOR NEW BUILDINGS: OPTION 2 - DATA AT&T 106 BFD AND AT&T 106 AFD DUPLEX JACKS

DATA RJ-45 DUPLEX JACK (TOP HALF)

WIRE	PIN ON JACK
White/Blue	1
Blue/White	2
No Connection (N/C)	3
No Connection (N/C)	4
White/Orange	5
Orange/White	6
No Connection (N/C)	7
No Connection (N/C)	8

DATA RJ-45 DUPLEX JACK (BOTTOM HALF)

WIRE	PIN ON JACK
White/Green	1
Green/White	2
No Connection (N/C)	3
No Connection (N/C)	4
White/Brown	5
Brown/White	6
No Connection (N/C)	7
No Connection (N/C)	8

APPENDIX B
PIN OUTS/CONNECTORS/TERMINATION DEVICES

DATA ADAPTER CONFIGURATIONS	
Macintosh 128, 512 Male DB-9	
Signal	DB-9
TXD	5
RXD	9
GND	3
DTR	6

Data Adapter Configurations	
Macintosh Plus, SE, II Circular-8	
Signal	Circular-8
TXD	3
RXD	5
GND	4
DTR	1

APPENDIX B
PIN OUTS/CONNECTORS/TERMINATION DEVICES
(Continued)

PUNCH BLOCK CONFIGURATION

Signal	Punch Down	Cross-connect Color	Signal Name
TXD	1	Red/Blue	Transmit Data
RXD	2	Blue/Red	Receive Data
GND	3	Red/Orange	Signal Ground
DTR	4	Orange/Red	Data Terminal Ready
RI	5 - If modem	White/Blue	Ringer
Apple Talk	5 - If Apple Talk	White/Blue	
CD	6 - If modem	Blue/White	Carrier Detect
Apple Talk	6 - If Apple Talk	Blue/White	

TERMINAL SERVER
RSA8 PIN OUTS

Signal	RSA8	RJ11	Signal Name
RI	22	1	Ringer
GND	7	2	Signal Ground
TXD	2	3	Transmit Data
RXD	3	4	Receive Data
DTR	20	5	Data Terminal Ready
CD	8	6	Carrier Detect

DATA ADAPTER CONFIGURATION

Data
DTX
00
1# - Error Check (DTR)
1# - Auto Answer
1# - Out-going modem
Data

APPENDIX C
GLOSSARY

Amplifier - A device which increases the power or amplitude of an electrical signal. Amplifiers are placed where needed in a cable system to strengthen signals weakened by cable and component attenuation. Two-way, single-cable systems use a forward and a reverse amplifier inside one enclosure to boost signals travelling in both directions.

Backbone wiring - The backbone wiring system is also recommended to be topologically arranged in a star configuration whether within a building or across a campus. The topology shall use a maximum of two levels of cross-connects (main and intermediate). Interconnection between two telecommunications closets shall pass through a maximum of three cross-connects (intermediate-main-intermediate). Only a single cross-connect shall be passed through to reach a main cross-connect. Telecommunications closets may be wired directly together.

The cables recognized in the backbone wiring are:
[] 100-ohm UTP cable.
[] 150-ohm STP cable.
[] 50-ohm coaxial cable.
[] 62.5/125 um optical fiber cable.

The distances for the topologies are the same across all media for the telecommunications closet to the intermediate cross-connect, 500 m (1640 ft) maximum. They vary for the distance from the intermediate cross-connect to the main cross-connect due to performance.

Balancing - Adjusting the gains and losses in each path of a system to achieve equal signal levels (usually to within 3dB) at all user outlets. A balanced network also provides near equal input signal levels to the headend from transmitters connected anywhere in the network.

Bandwidth - The frequency range that a component, circuit, or system can pass. For example, voice transmission by telephone requires a bandwidth of about 3000 Hertz (3 kHz). A television channel occupies a bandwidth of 6 million Hertz (6 MXz). Cable systems occupy 5 MHz to 300 or 400 MHz of the electromagnetic spectrum.

Branch - An intermediate cable distribution line in a broadband coaxial network that either feeds or is fed from a main trunk. Also called a feeder.

Cable Loss - The amount of RF signal attenuation by a given coaxial cable. Cable attenuation is mainly a function of signal frequency and cable length. Cables attenuate higher frequency signals more than lower frequency signals according to a logarithmic function. Cable losses are usually calculated and specified for the highest frequency carried (greatest loss) on the cable.

Cable Powering - Supplying operating power to active CATV equipment (for example, amplifiers) with the coaxial cable. This ac or dc power does not interfere with the RF information signal.

Cable TV - Previously called Community Antenna Television (CATV) . A communication system which simultaneously distributes several different channels of broadcast programs and other information to customers via a coaxial cable.

Cascade - The number of amplifiers connected in series in a trunk system.

Coaxial Cable - A single cable with two conductors having a common longitudinal axis. The center conductor carries information signals; the outer conductor (shield) is grounded for those signal frequencies to prevent interference. This shield is often made of a flexible foil or braid, or solid aluminum. The two conductors are separated by an insulating dielectric.

Cross Modulation - A form of signal distortion in which modulation from one or more RF carrier(s) is imposed on another carrier.

dB - Decibel.

Directional Coupler - A passive device used in cable systems to divide and combine RF signals. It has at least three connections: trunk in, trunk out, and tap. The trunk signal passes between trunk in and trunk out lines with little loss. A portion of the signal applied to the trunk in line passes to the tap line, in order to connect branches or outlets to the trunk. A signal applied to the tap line is attenuated and passes to the trunk in line, and is isolated from trunk out line. A signal applied to the trunk out line passes to the trunk in line, and is isolated from the tap line. Some devices provide more than one tap output line (Multi-taps).

Distribution Amplifier - A high gain amplifier used to increase RF signal levels to overcome cable and flat losses encountered in signal distribution.

Drop Cable - A flexible coaxial cable which connects a network tap to a user's outlet connector. Also called Drop Line.

Entrance facilities - The entrance facilities are where the intrabuilding backbone meets the local exchange carriers or interbuilding wiring within the building.

Equalization - A technique used to modify the frequency response of an amplifier or network to compensate for distortions in the communication channel. The ideal result is a flat overall response. This slope compensation is often done by a module within an amplifier enclosure.

Equipment room - The equipment room is an area within a building where major components of large voice or data communications systems are housed. Equipment rooms are distinct from telecommunications closets due to the nature or complexity of equipment they contain.

F Connector - A standard, low cost, 75-ohm connector used by the CATV industry to connect coaxial cable to equipment.

Filter - A circuit that selects one or more components of a signal depending on their frequency. Used in trunk and feeder lines for special cable services such as two-way operation.

Flat Loss - Equal signal loss across the system's entire bandwidth, such as that caused by attenuators.

Flooded Cable - A special coaxial CATV cable containing a corrosion resistant gell between the outer aluminum sheath and the outer jacket. The gell flows into imperfections in the aluminum to prevent corrosion in high moisture areas.

Forward Direction - The_direction of signal flow in a cable system that is away from the CRF or headend.

Frequency - The number of times a periodic signal repeats itself in a unit of time, usually one second. One Hertz (Hz) is one cycle per second. One kilohertz (kHz) is one thousand cycles per second.

Headend - The facility that contains a cable system's electronic control center, generally the antenna site of a CATV system. It usually includes antennas, preamplifiers, frequency converters, demodulators, modulators, and other related equipment which receive, amplify, filter and convert broadcast television signals to cable system channels. It might house a host computer in broadband data communication systems. In two-way broadband systems, the headend holds at least the frequency translator.

High Frequencies - Frequencies allocated for transmission in the forward direction in a midsplit broadband system, approximately 160 to 400 MHz.

Highsplit - A frequency division scheme that allows two-way traffic on a single cable. Reverse path signals come to the headend between 5-174 MHz; forward path signals go from the headend between 232-400 MHz. No signals are present between 174-232 MHz.

Horizontal wiring - The horizontal wiring is the wiring between the telecommunications closet and the telecommunications outlet.

Horizontal wiring - The horizontal wiring organization as defined by this project is a "star" topology. This means that every office outlet shall be connected to a telecommunications closet. Most systems today can accommodate this type of structure. Current implementations of IEEE802.3/Ethernet (a "bus" structure) and 802.5/Token Ring (a "ring" structure) have been designed to handle star wiring through concentrators or multiport devices.

The distances in the horizontal wiring are defined to be 90 m (295 ft) with an allowance in the work area for an additional 3 m (9.8 ft).

The cables that are recognized in the horizontal wiring are:
[] 4-pair 100-ohm unshielded twisted pair (UTP) cable.
[] 2-pair 150-ohm shielded twisted pair (STP) cable.
[] 50-ohm coaxial cable (thin coax).

In choosing a medium for use in horizontal wiring the following recommendations are made.

There shall be a minimum of two telecommunications outlets at each work area location. These telecommunications outlets are defined as follows:

[] An outlet which shall be supported by 4-pair 100-ohm UTP cabling.
[] Another outlet which shall be supported by one of the following horizontal media:
  () 4-pair 100-ohm UTP cable;
  () 2-pair 100-ohm STP cable;
  () 50-ohm coaxial cable.

These recommendations are made with the intent of accommodating a diversity of user applications in order to reduce or eliminate the probability of requiring changes to horizontal wiring to meet future needs.

Insertion Loss - The loss of signal level in a cable path caused by insertion of a passive device. Also called Thru Loss.

Interbuilding backbone - This is the same as the intrabuilding backbone except it goes between buildings through the entrance facility. There are other special considerations for the building-to-building wiring due to environmental and distance specifications.

Intermediate cross-connect - This is the same as the main cross-connect except it is a level lower in the hierarchy of backbone wiring.

Intrabuilding backbone - The intrabuilding backbone Consists of the transmission media, cross connects and terminations for interconnecting telecommunications closets, equipment rooms and network interfaces.

Isolation Loss - The amount of signal attenuation of a passive device from output port to tap outlet port.

Low Frequencies - Frequencies allocated for transmission in the return direction in a midsplit broadband system, approximately 5 MHz to 116 MHz.

Main cross-connect - Where wiring systems join together, there need to be some interconnecting scheme. This is defined as a cross-connect. The cross-connect is the top level in the hierarchy of the building wiring. Termination and patching are the functions performed by the cross-connect.

Midsplit - A frequency division scheme that allows two-way traffic on a single cable. Reverse path signals come to the headend between 5-116 MHz; forward path signals go from the headend between 168-400 MHz. No signals are present between 116-168 MHz.

Modem - A modulator-demodulator device. The modulator codes digital information onto an analog carrier signal by varying the amplitude, frequency, or phase of that carrier. The demodulator extracts digital information from a similarly modified carrier. It allows communication to occur between a digital device (for example, a terminal or a computer) and an analog transmission channel, such as a telephone voice line.

Multi-tap - A passive distribution component composed of a directional coupler and a splitter with two or more output connections. See Tap.

Network interface - The network interface is the point of connection between the local exchange carriers equipment/wiring and the intrabuilding wiring/network.

Noise - Any undesired signal in a communication system.

Pad - A passive attenuation device used to reduce a signal's amplitude.

Return Loss - A measure of the degree of impedance mismatch for an RF component or system. At the location of an impedance mismatch, part of the incident signal is reflected back toward its source, creating a reflected signal. The return loss is the number of decibels that the reflected signal is below the incident signal.

Return Path - Reverse direction; towards the headend.

Signal Level - The RMS voltage measured at the peak of the RF signal. It is usually expressed in microvolts referred to an impedance of 75 ohms or in dBmV.

Slope - The difference between signal levels at the highest frequency and at the lowest frequency in a cable system. Also called spectrum tilt.

Slope Compensation - The action of a slope-compensated gain control. The gain of the amplifier and the slope of amplifier equalization are changed simultaneously to provide equalization for different lengths of cable; normally specified in terms of cable loss.

Splitter - A passive device that divides the input signal power from the forward direction into two or more output signals of less signal power. Input signals from the reverse direction are combined into a single signal and passed toward the headend. Splitters pass through 60 Hz power to all lines.

Station equipment - Station equipment resides in the work. This could be terminals, PCs, Systems or monitoring equipment.

Surge Arrestor - A device that protects electronic equipment against surge voltage and transient signals on trunk and distribution lines.

Tap - A passive device, normally installed in line with a feeder cable. It removes a portion of the signal power from the distribution line and delivers it to the drop line. The amount of power tapped off the main line depends on the input power to the tap and the attenuation value of the tap. Only the information signal (and not 60 Hz power) goes to the outlet ports. See also Multi-tap.

Tap Outlet - A type F connector port on a tap used to attach a drop cable. The information signal is carried through this port. The number of outlets on a tap usually varies from two to eight.

Telecommunications closets - The telecommunications closet is the area defined within a building to connect the intrabuilding backbone to the horizontal wiring. It can contain cross-connects, terminations and active or passive equipment to support the customer needs for telecommunications services.

Telecommunications outlets - The telecommunications outlets are the interconnection points between the horizontal wiring and the work area.

Termination - A 75-ohm resistor that terminates the end of a cable or an unused tap port with its characteristic impedance to minimize reflections.

Trunk Amplifier - A low distortion amplifier that amplifies RF Signals for long distance transport.

Trunk Cable - Coaxial cable used for distribution of RF signals over long distances throughout a cable system. Usually the largest cable used in the system.

Work area - The work area is defined as the location of the station equipment and work area wiring up to the telecommunications outlet. The work area wiring is nonpermanent and has special considerations in management.

*(All information from) -
Broadband Network Technology by Edward Cooper, Prentice - Hall,
1986 Englewood Cliffs, New Jersey.

APPENDIX D
SPECIFICATION CHECKLIST

This excerpt from the BICSI Telecommunications Distribution Methods Manual contains a checklist of specifications telecom designers can use to inform a construction contractor in detail of the methods and materials their plans require.....

PLEASE NOTE: OUR EFFORTS TO SCAN THIS DOCUMENT WERE NOT SUCCESSFUL. WE WILL TRY TO OBTAIN A MORE LUCID COPY OF THE DOCUMENT, AND WILL PROVIDE A COPY OF THIS DOCUMENT WHEN IT HAS BEEN SUCCESSFULLY SCANNED.

APPENDIX E
MEMBERS
OCOTILLO RESEARCH/ACTION COMMITTEE
ON
TECHNICAL STANDARDS

Ken Baer	District
Jerry Baxter	Paradise Valley CC
Jan Baltzer	District
Diane Bondurant	District
Lionel Diaz	District
Manny Griego	Glendale CC
Bob Huddleston	Gateway CC
KC Hundere	District
Sam Matar	Glendale CC
Don Shehi	District
David Waters	District